

BREAK-IN

January/February 2011

The Official Journal of the
New Zealand Association of Radio Transmitters (Inc.)

Dedicated to

Amateur Radio and Electronics

in New Zealand since 1928



In this issue:

- ▣ Building trapped dipole antennas for the HF bands
- ▣ NZART Council elections
- ▣ Radio in the NZ Post Office; Part 2
- ▣ Homemade 2m/70cm dual band flexible antenna
- ▣ NZ DX Hall of Fame
- ▣ ZL Crossword No.10
- ▣ RadioTek; a day of radio technology
- ▣ *Break-In* Readership Survey



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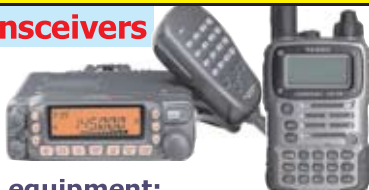
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The term **break-in** refers to a system in CW whereby the transmitting station can hear the other station's signal during "key up" periods.

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Cover photograph: Harry ZL1BK on Mount Ruapehu
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grammar, legality and good taste.

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From The President

Roy Symon ZL2KH
<zl2kh@xtra.co.nz>



I hope that all of you had an enjoyable Christmas without all of the commercial pressure that, sadly, has taken over this festival. The last year was a challenging one with plenty of debate on many matters. We are all entitled to our opinions; and it is important to remember that others are also entitled to theirs. This is a healthy situation and shows that people are interested and involved. Amateur radio is a hobby and should be enjoyed. This is possible if we all realise that we are not always right; and that the message of the very first Christmas should always be

observed: "Peace on Earth – and goodwill to all men".

I am writing this before the list of those who have been nominated in the current elections has been published. Those who have been nominated are to be congratulated on making themselves available. It is now up to all of the members to exercise their democratic right and vote. In past elections only a minority of those eligible to vote have done so. Let's put apathy aside this time and have a good turn out and make 2011 a really good year for amateur radio.

Roy Symon, ZL2KH
President, NZART (Inc)



WELLINGTON EXPO-11

The Wellington Region **EXPO-11** is to
be held on

Easter Saturday 23rd April 2011

in conjunction with the **VHF Convention**

**At the Tawa College Gymnasium,
Duncan St, Tawa**

Admission to the EXPO is \$4. Each ticket includes a free drink and entry into the various raffle draws. Listen out for the raffle draws throughout the day by MC ZL2BHF.

There will be trade displays, trade sales of new amateur equipment and of course trading tables of used equipment as well as a display of military radio equipment.

Times: Opens at 10am (Vendors 7am). Closes at 1pm

Refreshments; coffee, soft drinks, buns & cakes will be available.

All inquiries for table sales and bookings to:
Gavin Cross ZL2TVM Email: <zl2hv@nzart.org.nz>

Copyright and *Break-In*

This policy statement issued in April 2010 by NZART Council replaces any previous documents covering Copyright.

General

Copyright is governed in New Zealand by the Copyright Act 1994, Copyright (New Technologies) Amendment Act 2008 and the Copyright (General Matters) Regulations 1995 and any amendments or successor Acts and Regulations.

Copyright of an original work currently lasts for 50 years beyond the death of the author.

Publishers copyright currently lasts for 25 years from publication.

The Copyright Tribunal is a statutory body pursuant to section 205 of the Act. The Tribunal hears disputes relating to the provision of licences allowing the copying, performing and broadcasting of works.

An excellent reference website is that of the Intellectual Property Office of New Zealand (IPONZ) <<http://www.iponz.govt.nz/cms/copyright/>>. (Part of the MED stable.)

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- 2 That *Break-In* assert NZART's copyright to all the material as published as follows:

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EXPLANATORY NOTES

Basic

Copyright comes into existence when an original work is created or published. In New Zealand there is no register of copyright works and the creation of the copyright is automatic. This also applies to the typographical arrangement of a published edition which includes the layout of the edition which may contain several separately copyright works.

Author and Publisher

Particularly with reference to *Break-In* it should be realised that whilst NZART owns the copyright of the completed magazine and the "as published" content, the original author of articles or advertisements etc retain their respective copyrights. This also means that an article can be re-published by *Break-In* without alteration. However alterations to the content of the article would need to be approved for publication by the original author.

Employment

The creator of a work is normally the copyright owner. However work produced during the course of employment is copyright to the employer unless a contract specifying otherwise has been entered into. When a person commissions and agrees to pay for a work then the commissioner owns the copyright to the work.

Assign Copyright

It is also possible for the author to assign copyright to another person but this requires a formal contract to do so and it is advisable to register the assignment of copyright with the IPONZ office.

Multiple Submission

Articles must not be submitted to several publishers as this can lead to copyright infringement issues for the publishers.

NZART Council Elections 2011; Candidates biographies

Presidential candidates (1 required)

John Andrews ZL2HD



John was first licensed as ZL2TZZ and ZL2NAZ while at college, and has been a keen ham since those days, active in AREC (Civil Defence and Land SAR), JOTA, VHF and HF field days, Wellington Branch 50 and the Wellington VHF Group.

John studied at Canterbury and Victoria Universities, and then joined IBM, where he worked in New Zealand and Saudi Arabia. Returning to ZL in 1999, John became involved in ham radio again. John served on the NZART Business Management Sub Committee, where

he gained an insight into NZART operation and recently on Council. During his time on Council he has worked on a number of key issues and represented NZART and amateur radio in many areas. John has held technical and management roles in a local high-tech company and is now self-employed.

John is very keen on promoting all types of Amateur Radio, and has helped in his local primary school, introducing them to electronics and radio, has run successful classes for new amateurs and worked hard to bring in new hams and NZART members.

John believes that the hobby of amateur radio is different for each ham, and all the aspects, from building radios, contesting, rag chewing, experimenting, data modes, satellites, AREC, contesting, ATV, and even the organisation of the hobby, are all a great way for people to develop and enjoy themselves. The job of NZART Council is to support the hobby and provide effective leadership and management of the national body in the interests of all members and amateurs.

John is looking forward to using his experience and skills while working hard to ensure the future success of our association and hobby.

Simon Lewis ZL4PLM



I am 45 years old and live in the small village of West Melton near Christchurch. I run my own IT consultancy company specialising in large scale change and business transformation projects for large global corporates. I live with my wonderful fiancée, Christina, and our two teenage sons.

I am an active member of Branch 56 Christchurch West and Canterbury Amateur Radio Development Society (CARDS). I have been licensed for over 30 years and am a very

active amateur enjoying HF DX'ing/contesting, VHF-SHF construction and weak signal DX'ing, with my main interests lying in the area 50 MHz and up.

I have edited numerous newsletters and email reflectors as well as having edited *Radio Communications* magazine's "Microwave Column", the VHF-SHF technical publication *DUBUS* etc. I have been involved with many radio groups at committee level in organisation such as the RSGB, UK Microwave Society, UK Radio Amateur Emergency Network etc.

I am standing for President and Council as I believe it's essential that your national association shows clear guidance on amateur radio's present and future existence and fully engages and supports its members. It must draw on its member's skills and knowledge and utilise them

fully – not alienate them.

Council, NZART officers and support teams such as FMTAG cannot act alone. They need to fully engage with members and not work in isolation, but work together, using opinion formed from committees of subject matter experts, not single individuals, before engaging on policy decisions in critical areas like band planning and frequency management.

NZART needs to listen more to your opinions and act on them in an informed and timely manner. It needs a strong leader, with the skills, business acumen and ability to create and execute a strong focused strategy to get NZART back on the rails, I consider that as a leader it is critical to engage and motivate and to build strong relationships, both within the management team and also with members and external stakeholders alike. It needs to become an open and trusted organisation, transparent, and visible in how it operates.

We need to create a modern organisation and structure for all New Zealand amateurs, that will grow and become a proud society again, that makes amateurs feel they can be part of it, because of what it offers, not because they feel obligated to do so.

I am asking for your vote that will allow me to form a strong council to execute this vision. In return I pledge to ensure that we deliver on our election promises and deliver the changes that are so desperately needed.

Simon ZL4PLM

Roy Symon ZL2KH



- First licensed in Palmerston North, 1965, where I was Branch 20 Secretary.
- Resident in New Plymouth since 1967.
- Retired pharmacist.

Currently:

- Life Member and Past President of Branch 27;
- Secretary / Treasurer of the Society for the Preservation of Amplitude Modulation NZ (SPAM) since 1994.

- Secretary / Treasurer of Old Timers' Club (ZL) since 2001.
- Regular contributor to "Break-In" (SPAM since 1994 and OTC since 1998).
- Central district NZART Councillor; 2003 to 2009.
- NZART President; 2009 to 2011.
- Active mainly on 80 and 40 metres, VHF and UHF.
- Active in AREC, Landsar and Civil Defence.
- Chairman of New Plymouth Conference 2005 committee.

I have the time, experience and ability to do my best for NZART. If elected I intend to continue to work for the betterment of amateur radio. It is my opinion that we need a transparent administration with the maximum input from all members. Our hobby is fantastic, and I will continue to do my best to see that it prospers in all matters.

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THEY SUPPORT *BREAK-IN*

Councillor candidates (3 required)

NORTHERN ELECTORAL DISTRICT (3 required)



Neill Ellis ZL1TAJ

My name is Neill Ellis ZL1TAJ, I'm 46 and live in Tauranga, my ex and her children are now all overseas, both daughters now married. As the President of Branch's 39 and 53, on the Committee of Branch 81, I am active in local branches and in touch with the members. My background includes NZPO, Telecom NZ, managing a Radio company and I also have

experience in the IT industry.

I believe that NZART must continue to be the organisation to guide our hobby into the future. We are facing the crisis of falling membership and increased costs. Members should be able to choose how they receive our magazine, how our society should be structured and have a voice in how our councillors perform their duties. I'm passionate about NZART remaining the agency for all Amateurs in NZ, maintaining the examination system and our repeater engineering under NZART's services.

Licensing, maintaining membership, protecting our bands and maintaining our good name in the amateur radio world are just some of the challenges we will face. Council can only succeed by working together as a team. Consultation with appropriate parties needs to take place when policy decisions are being made. It is my hope to join council and help it work together as a team, so that the association may adapt to survive in the modern environment it finds itself in.

Neill Ellis ZL1TAJ



Stephen Hayman ZL1TPH

Aims and objectives;

- NZART council working together in a team environment, with sound vision and leadership ahead for the future of the Association.
- The pastime of the many interests groups to move forward, with a strong directive from a well organised elected body.

- Retention of our current assets along with inspired membership growth created with confidence within an executive working team.
- Council developing and maintaining policies, plans and strategies to manage its functions and to deliver identified outcomes for our community.
- Honesty and reliability, a pre-requisite for involvement in the management of a body that is going to represent our hobby to the fullest.

Personal resumé;

- Amateur radio licence attained in 1973 from the Wellsford branch
- Age 53 years and reside north of Auckland city
- Self employed for the last 12 years, within a business partnership in the telecommunication industry
- Active amateur on HF and VHF
- To represent NZART, to the best of my ability

Stephen Hayman ZL1TPH



Vaughan Henderson ZL1TGC

First licensed in 1968, my amateur radio activity to date has been mainly on the VHF and UHF bands. I do plan to get operational on the HF bands – I have a 15m mast and tri-band beam ready to go up. I enjoy contesting and as time permits, construction of electronic and amateur radio related equipment as well as taking a keen interest in emerging

technologies.

I am immediate-past Chairman of North Shore Branch 29 and since 2008, have run amateur radio classes for the branch, something I plan to repeat in 2011. I am also on the committee of the Auckland VHF Group, Branch 66 and assist as a repeater trustee and National System trustee. I have been a member of NZART Council from 1981 to 1985, and again from 1991 to 1998, served as Vice-President from 1999 to 2002. Currently a Council member and Vice-President having been re-elected in 2006.

I have enjoyed a varied technical career, starting as a telecommunications technician, followed by some 14 years as a computer network engineer. From there, moved into marine electronics and am now self-employed, working on a variety of marine projects. I am married with two adult children (and two grandchildren!).

I strongly believe that NZART is the organisation to represent our hobby to government and local bodies and should provide positive proactive leadership. We enjoy a large amount of radio spectrum compared to most other organisations and protecting this resource against intruders and the encroachment of new technologies is one of our most important tasks.

If re-elected to Council, I am keen to take a more active role in promoting amateur radio to the general public and through that, get new people into amateur radio. I also want to encourage more Branches to recruit new members leading to an increased membership of the national association. I also hope to improve the level of communication between Council and the membership, to try and keep all members better informed of current issues and through that, achieve a stronger NZART.

Vaughan Henderson ZL1TGC

Phil King ZL1PK



I was first licensed in Rotorua as ZL1AWQ in 1959, and operated for several years in Auckland and Papakura whilst a student. In the following years I spent time in various areas throughout New Zealand, holding call-signs ZL4KZ, ZL3AAK and ZL1PK. I became a member of AREC in Rotorua in 1959 and in the early 1970s became the Section Leader of the very active Rotorua Section continuing

in that role for 15 years.

During my work career I was a radio technician at Musick Point for a short while, then taking on various technical and engineering roles in Telecom, including computer operations. At Waikato District Council my work with computer operations continued. Although now retired, I am continuing as Electoral Officer for Waikato District Council.

While I work HF and VHF/UHF regularly, I primarily can be found on APRS, Packet Radio and AREC activities.

I am currently an NZART Council member, having been elected in 2009; I have filled various positions in NZART branches: Rotorua branch-President and AREC Section Leader; Hamilton-Secretary for many years and recently Vice President and Deputy AREC Section Leader. I am an Honorary Life Member of Rotorua, and Hamilton Branches and on the executive of Waikato VHF Group. I maintain membership in other groups including Auckland, Wellington, and Waikato VHF Groups, AMSAT-ZL (Founding Member), AMSAT-NA (Life Member) and TAPR.

In my 50 years with amateur radio I have seen many changes. Our hobby faces many challenges; from those who feel they could make better use of our frequencies, and from the changes that occur in society.

For our hobby to continue we must all work together. My focus is in meeting challenges, keeping up with all developments affecting amateur radio and strengthening NZART.

CENTRAL ELECTORAL DISTRICT (3 required)

John Andrews ZL2HD

(Refer Presidential candidates.)

Warren Harris ZL2AJ



As an amateur radio operator since 1993, I have had an active interest in most aspects of our hobby. At 34 years of age, I have the drive to achieve amateur radio goals and challenges. I am a very active amateur, participating in designing and developing VHF and UHF repeaters and organising and assisting with communications in local and national car rally events. Chasing DXCC on the HF bands and

participating in local, national and international contests offers me the challenges that I enjoy.

As President of the Hawkes Bay Amateur Radio Club (Branch 13) for five years and chairing the organising committee for the NZART conference of 2009 in Hawke's Bay, I like to get things done and done on time. Over the past four years I have been instrumental in the resurgence of amateur radio in Hawke's Bay as the leader of a training team to licence 42 new amateurs which boosted the activities and membership of our local club. I have recently been appointed as the NZART National Training Officer along with becoming a MED ARX.

My professional qualifications include being a Certified Electrician and I have Electrical Inspector's Certification. I have operated my electrical contracting business in Hawkes Bay for many years employing staff and believe that I can bring a fresh viewpoint and a different set of amateur radio and business skills to NZART Council.

Amateur radio in New Zealand at present is very different from the past. I believe strongly in NZART as the organisation to foster our hobby in the future. Frequency resources, licensing, and the number of operators are ongoing issues. With strong leadership and innovative policies NZART will be able to address those issues while being very aware of our roots and traditions. It is time to move on from the issues that have dogged NZART for years. It is time to resolve issues, solve problems and make a fresh start. We must not dwell in the past.

I would welcome the opportunity to be elected to Council and serve NZART and Amateur radio in New Zealand.

73,

Warren Harris ZL2AJ

Fred Johnson ZL2AMJ



Firm supporter of NZART since licensed when a schoolboy, active on most bands and modes. Developed beginner kitset construction projects. Retired professional radio engineer, tutor, technical institute inspector, head of Electrical Engineering at New Zealand's largest polytechnic. Trialling a new modern training scheme. Developed "Radio Wave" demonstration kits and hand-out CDs for advancing radio in

schools and the next generation of amateurs.

Honoured as Member of the New Zealand Order of Merit (MNZM) for service to amateur radio; received awards from IARU societies for promoting international goodwill; Honorary Life Member of NZART; member of several Branches; Past-President and NZART Councillor. Previous Director and Chairman of IARU Region 3; conducted IARU courses on Amateur Radio for Administrators in Region 3 countries. Amateur Service representative on New Zealand delegations to ITU conferences; instrumental in protecting access to the spectrum including clearance of broadcasters from the 40m band.

Sees NZART's role as a strong national association; representing and

The Doctor is in: Pacemakers and RF

(Reprinted from "The Doctor Is IN", QST)

Schley Cox W4AMW, of Owensboro, Kentucky, told the Doctor that he's headed to see the cardiologist next week about a pacemaker. He's already started researching their use around RF and says he is happy to go all low power (QRP), if that's what's called for. Schley mentioned that he might also be able to operate his rig remotely; perhaps 20 ft away, but he needs to know how to measure stray RF in the shack itself. Here's what the Doctor had to say:

"I haven't received actual reports of any pacemaker problems and that seems to go along with the info on the ARRL Website <<http://www.arrl.org/pacemaker>>.

"Note: that there are no power levels (or field strength) limits noted there, nor have I found any on manufacturers' websites. Thus knowing the actual field strength level in the station may not help. If it were me, I would start by talking to my physician. She won't be able to give you power limits, but perhaps could indicate symptoms to watch for while on the air so you could take appropriate action quickly if called for.

"I would start with a careful RF safety evaluation, as required by the FCC anyway. While the FCC guidelines were not based on pacemaker interference, they should result in a reasonably safe environment. If your station is properly set up; without common mode feed line current, for example, most radiation should surround the antenna and there should not be much RF within the shack.

"Calibrated RF field strength meters are available, but are quite expensive. Relative measurement is pretty easy; look at any recent *ARRL Handbook*. If you had a simple field strength meter running at all times in the station (I'm thinking of the diode and microammeter type that doesn't require power), you could see if anything changed, and diagnose and repair as needed."

Thanks Doctor!

promoting the interests of members to government; protecting and improving spectrum access; providing leadership and governance on key issues; identifying problems; accepting advice of subject experts; being positive, proactive, and decisive. Committed to develop NZART with better, faster and disciplined methods for information-processing; to increase membership; and vociferous pursuit of spectrum intruders. Offering experience coupled with passion and commitment to Amateur Radio; well equipped with time, skills and resources for this essential work.

MIDLAND ELECTORAL DISTRICT (2 required)

Ann Fraser ZL3TNT

Simon Lewis ZL4PLM

SOUTHERN ELECTORAL DISTRICT (1 required)

No nominations received

Based on the above an election is required for both President and the Northern Electoral District.

Subject to the result of the election Council will need to consider the appointment of Councillors to represent those districts that will not be fully represented in accordance with the Association's Constitution.

Evan T Sayer
Returning Officer

New Zealand DX Hall of Fame Citations – 2011

The New Zealand DX Hall of Fame was established in 2009 to honour those outstanding ZL DXers and contesters who have excelled in our radio sport hobby over many years. The current panel of judges includes Ken McCormack ZL1AH, Duncan McMahon ZL3JT and Bill Carney ZL3NB.

Previous winners have included, Roy ZL4BO, Ron ZL1AMO and Jock ZL2GX (SK) in 2009. Winners in 2010 included Dave ZL1AMN, Aola ZL1ALE and Dave ZL1HY (SK)

This year, after much deliberation the judges were unanimous in their selection and have elected the next three ZL radio amateurs to the New Zealand DX Hall of Fame for 2011. Their individual citations are below.

John N. Shaw ZL1BYZ

The election of John Shaw, ZL1BYZ as the seventh inductee to the NZ DX Hall of Fame recognises his extraordinary abilities as a contester and DXer. Licensed in 1983, John has proven to be a prolific contest operator and amazing DXer with most of his operations on CW. He usually places highly in major international contests and generates enormous pileups when he operates from

his Pukekohe farm. John was a member of the ZL6QH contest group, ZL7T DXpedition, ZL6LH Lighthouse team and a long time active member of the Papakura Radio Club.

He has won the Doug Gorman Frequency measuring contest and numerous Jock White Field Day contests. He was recently made a member of the ARRL A-1 Operators Club. John will be joining the ARRL DXCC Club soon with an initial entry of over 300 countries. He contributes much to the sport of Amateur Radio Contesting and DXing in New Zealand.

We wish John well in the future and hope that he will enjoy having the NZ DX HoF award plaque on his shack wall

Bryan Anderson ZL2AFT

The election of Bryan Anderson as the eighth inductee to the New Zealand DX Hall of Fame recognises his superb DXing skills and



Bryan Anderson ZL2AFT.

outstanding contribution to the sport of radio DXing.

Licensed in 1954, Bryan has a long history of working DX with his own homebuilt equipment and had over 200 countries confirmed by 1975. In 2009 he achieved DXCC #1 Honor Roll with 354 confirmed, mostly with antique Drake equipment and a home-built Quad. Bryan has given outstanding service to his local radio club and assisted many ZLs to achieve DX in the pile-ups. He has always tried to keep the hobby in perspective and not let it interfere with the more important things in life, such as his family and his work as a Polytech lecturer in Palmerston North.

We wish Bryan well in the future and hope that he will enjoy having the award plaque on his wall.

Peter W. Watson ZL3GQ (SK)

To the family of Peter Watson. It gives me great pleasure to inform you that Peter Watson, ZL3GQ (SK) has been elected to the New Zealand DX Hall of Fame.

The posthumous election of Peter as the ninth inductee to the New Zealand DX Hall of Fame recognises Peter's extraordinary and unselfish contribution to the sport of Amateur Radio DXing in New Zealand. From his 5.5 acre on the outskirts of Christchurch he achieved 323 entities by 1997, DXCC HR in CW, DXCC HR in Phone, 5BDXCC with 160m Endorsement, 5BWAZ Award #29, 160WAZ Award #26.

His passion was 160m and CW. He routinely set CQWW contest records and recorded the first ZL to VS6 top-band contact. As an FOC member he was awarded the pres-



Plaque awarded to those elected into the NZ DX Hall of Fame.

tigious Al Slater award by the FOC committee for outstanding services to amateur radio. He was also a member of the ARRL A-1 Operators Club and a team member of the May 1996 ZL8RI DXpedition to Raoul Island in the Kermadecs. He was an outstanding ZL radio amateur for decades. His last contest was in February 1998 and he became a SK on March 27 of that year.

This award honours Peter's wonderful DXing and Contesting skills and will attest to how accomplished this great New Zealand DXer was.

We offer our heartiest congratulations to these three outstanding ZL radio amateurs who have been elected to the New Zealand DX Hall of Fame in 2011.

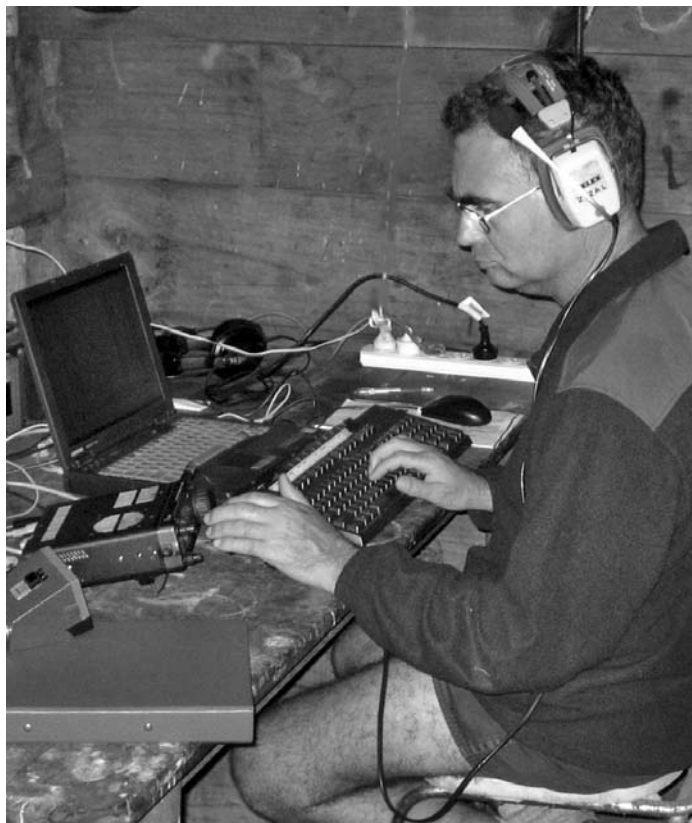
Thanks to Ken, Duncan and Bill for their work in selecting the inductees. New Zealand has a rich history of producing world renowned DXers and Contesters. We are delighted that these ZL DXers have been recognised. They are among the best of New Zealand amateur DXers.

73, Lee Jennings ZL2AL
New Zealand DX Hall of
Fame, Panel Convener

REMEMBER:

Leave a three second
pause between overs
when using repeaters.

Someone else may have
an urgent message.



John N Shaw ZL1BYZ.

Building Trapped Dipole Antennas for the HF Bands

By David Conn VE3KL

(Reprinted from The Canadian Amateur, Jan/Feb 2010)

Introduction

This article presents a simple design method for a two-band trapped dipole antenna. This type of antenna was designed to permit the user to feed the antenna at the centre using coaxial cable instead of an open wire transmission line. The original idea was published by Chester L. Buchanan W3DZZ in the March 1955 issue of *QST*. W3DZZ points out that if the antenna is excited by a frequency that corresponds to the trap resonant frequency, the traps serve to isolate the center section of the antenna much as if insulators were inserted at these points. The trapped dipole does not require much if any matching so very simple low loss tuners can be used.

Note: This article uses TCA HotLinks to provide access to enriched media from the RAC website. For more information, please go to <www.rac.ca/tca> Jan/Feb 2010.

There have been many conflicting articles presented over the years about these antennas with some who favour them and others who warn about trap losses, low gain, failures due to overheating, capacitor breakdown and the need for maintenance. However, like all antenna systems, there are always compromises that might or might not meet your needs. On the other hand there are many examples of outstanding traps that have been made including the traps used in the HyGain® TH-3 beam antenna. For this study, I have built several traps for a two band trapped dipole (40 and 30m) and performed antenna simulations for the antenna which was also built and tested during the summer of 2009. In general, I have found that these antennas are quite easy to build and tune if you follow ordinary design and fabrication procedures for the antenna and the traps. Antenna simulators like EZNEC even calculate the trap power dissipation, antenna efficiency and capacitor voltages so you can make good decisions about the power capacity of the antenna system.

Luckily, there are many articles that show how traps are made that can help you in the construction phase. Some of these articles are included in the TCA Hotlinks of this article.

It is highly recommended that you read TCA HotLink, 1 by LB Cebik who describes trapped dipoles and compares them with the alternative of using ladder lines

and antenna tuners: both have their merits.

This article includes:

- A description of trapped dipoles.
- A description of basic traps and their requirements: what Q, inductance and resonant frequency are required?
- The design procedure for trapped dipoles: how is this antenna tuned?
- Example of a 40/30 m trapped dipole.
- Hotlinks that describe how to make simple traps.

Trapped dipoles

A block diagram of a two band trapped dipole is shown in Figure 1. There are two traps that separate the antenna into three sections. The simple explanation of its operation is that the trap is resonant at the highest band of operation: 10.1 MHz in the example given in this article. The center section, L_c , is approximately one half wavelengths long at 10.1 MHz. The currents flowing in the outer sections of the antenna at 10.1 MHz are very small so the antenna behaves as a simple dipole at the highest frequency band of operation. Assuming that the low frequency band of interest is 7 MHz, the trap appears as an inductor at this frequency so the antenna performs as a short loaded dipole at 7 MHz. The total length of the antenna L_{Total} is less than one half wavelength at 7 MHz. This antenna works well for locations that do not have quite enough space

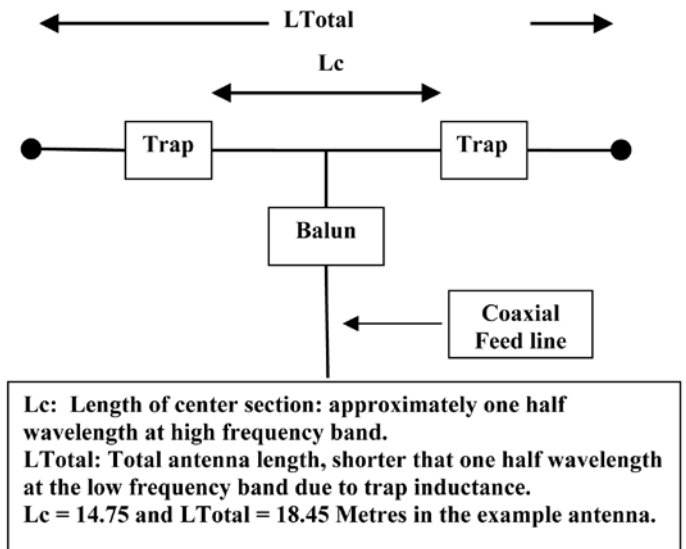


Figure 1. Two band trapped dipole; block diagram.

for a full sized dipole. The key to the design of a successful trapped dipole is making a trap that has a high enough Q to reduce losses and is set to the correct resonant frequency. A good design goal is to keep the total loss less than 0.5 dB for both traps.

The design of good traps is a complex problem which is only partly covered in this article. The article focuses on the antenna design under the assumption that you know how to build a trap. However, two trap examples are given along with TCA Hotlinks that you can use for trap design and

construction. One excellent piece of work is given in TCA Hotlink, 2 by VE6WZ who presents designs for very high Q loading coils that can be used as a basis for traps.

Basic traps

All traps are basically a parallel resonant circuit, Figure 2, that consists of a high Q coil in parallel with a low loss high voltage/current capacitor. The trap is characterised by its resonant frequency, Q and power handling capacity. Since these traps have extremely high impedance at resonance, the voltage across the capacitor and the

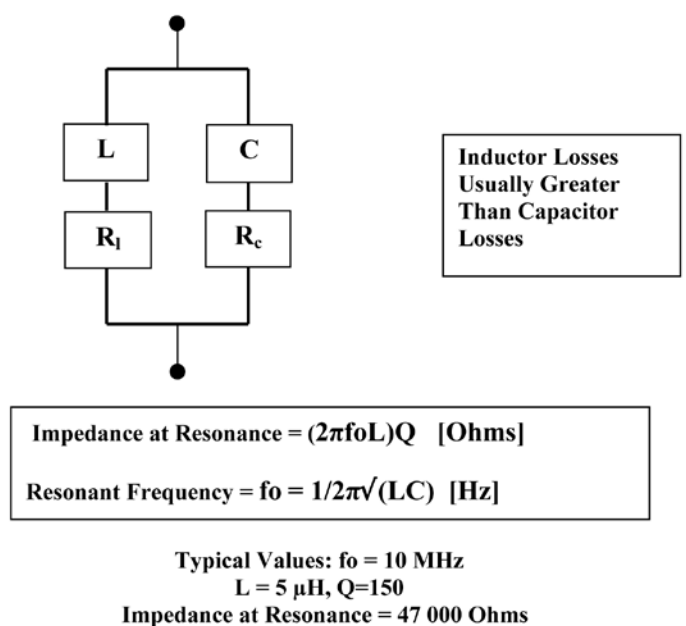


Figure 2. Equivalent circuit of a trap.

current flowing through the coil can be quite large. For example, the capacitor voltage can exceed 500 V when used with a 100 W transceiver. Traps are usually operated slightly below their resonant frequency to reduce high voltages/currents and power loss. However, if they are operated too far below resonance, they make tuning of the antenna difficult.

There are many kinds of traps that have been fabricated for antenna systems. These include:

1. A coil connected in parallel to a single high quality capacitor. This type of trap can have an extremely high Q but must be constructed with care if longevity is needed. They are commonly called LC traps.
2. The single coaxial trap, TCA Hotlink, 3 that consists entirely of a coil of coaxial cable such as RG-59 or RG8-X and connected in a way that the inductor results from the coiled coaxial cable and the capacitor results from the internal capacitance of the cable. Hence there is no physical capacitor connected to this type of trap. This is a low Q trap if fabricated using RG8-X but gives a higher Q with RG-59, TCA Hotlink, 4
3. The double coaxial trap, TCA Hotlink, 4, where two coaxial cables are wound on a coil form. This type nearly doubles the break down voltage and is similar in principle to the single coaxial trap.
4. Many variations of the above such as using coaxial cable to form

an inductor and a coaxial open circuit stub to form the capacitor. This type of trap is the easiest to make and produces a moderate Q . It is rugged and practical for portable antennas.

5. The trap type that is used in most commercially made Yagi beams that consists of a high quality coil mounted inside an aluminium tube. The combination of the coil and tube produce the required resonant frequency.

The required Q of the trap

Trap losses can dominate the performance of the antenna if the Q of the traps is too low.

To determine the required Q of the trap, I have simulated the antenna system using 4nec2x antenna simulator to find the gain as a function of the trap Q under the assumption that the traps are tuned to resonance at 10.1 MHz. These results are shown in Figure 3. As seen, a trap Q of 200 produces a gain at 7 MHz that is nearly ideal with little impact due to the trap. However, the gain at 10.1 MHz is about 0.4 dB lower than the optimum. The situation is quite different for Q values between 50 and 100 where the trap losses become a serious factor, especially at 7 MHz. traps with a very large Q can be made under lab conditions but many reports indicate that it is difficult to achieve Q values greater than 200 when considering real weather conditions and other factors that tend to lower the Q . Hence, a good design goal is to set the value of Q to 200. Good LC

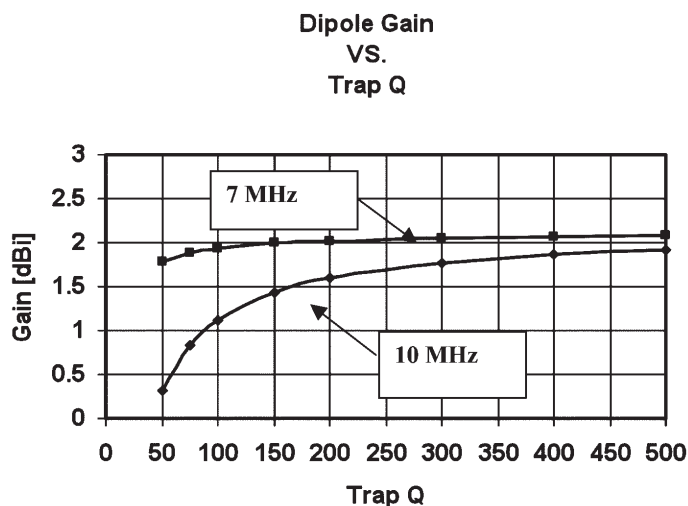


Figure 3. Antenna gain VS trap Q . The antenna is a 30/40 metre trapped dipole operated in free space. All losses are set to zero except for the trap. In this case the trap resonance is equal 10.1 MHz.

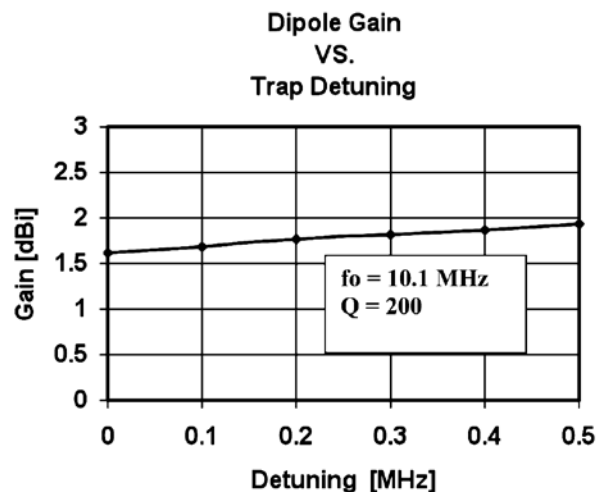


Figure 4. Antenna gain VS trap Q . The antenna is a 30/40 metre trapped dipole operated in free space. All losses are set to zero except for the trap. In this case the trap resonance is equal 10.1 MHz.

traps can be made with a Q of at least 200 in the HF bands, TCA Hotlink, 5.

The required trap resonant frequencies

The original idea was to set the trap frequency to the highest operating band, in the examples given here, 10.1 MHz. Unfortunately, as stated before, if the trap is operated at its resonant frequency, very high voltages and currents exist on the traps and the antenna efficiency and gain is lowered by a significant amount. The best strategy is to lower the trap frequency to avoid this problem. However, if the trap resonant frequency is too low, the antenna is hard to tune. So, what is the best resonant frequency for the trap? The upper limit is set to avoid too much loss and the lower limit is set to ease the tuning problem for the antenna. The method that I use is the following:

- The minimum amount of detuning is $\Delta f = 3 f \delta Q$ where f_0 is the resonant frequency of the trap, Q is the Quality factor of the trap and Δf is the amount of detuning from the lower limit of the high frequency band: in the example used in this article the upper band starts at 10.1 MHz. To be safe, Q is taken as 100 for this calculation. For example, the amount of detuning should be equal to 0.3 MHz. Then $f_0 = 10.1 - 0.3 = 9.8$ MHz. The formula above is derived from the universal resonance curve under the assumption that its response is down to approximately 0.2 of

its peak value (-14 dB).

The Quality factor of any network is well discussed in TCA, Hotlink, 6. The quality factor relates to the losses in the trap and its bandwidth.

- The suggested maximum amount of detuning is $\Delta f = 0.25 (f_2 - f_1)$ where f_2 is the bottom edge of the high frequency band and f_1 is the bottom edge of the low frequency band. In the example given in this article $f_2 = 10.1$ MHz and $f_1 = 7$ MHz. Hence, the maximum amount of detuning is equal to 0.78 MHz and $f_0 = 9.32$ MHz.

Notice that the difference between the maximum and minimum amount of detuning is quite large. This means that the construction of traps is not critical at all: in most cases the traps can be constructed with little or no tuning being required. This makes the construction of trapped dipoles very easy.

Figure 4 shows the impact of detuning the traps below 10.1 MHz for the example given here. The gain is increased by approximately 0.3 dB for detuning by 0.5 MHz as compared with the gain at resonance. Here the Q is assumed to be 200 as before.

The required trap inductance

The impedance level for the traps is not critical but a good starting point is to set the inductive reactance of the trap coil to approximately 377 Ohms at the highest band of interest. If the inductive reactance is very high/

■ continued on page 10

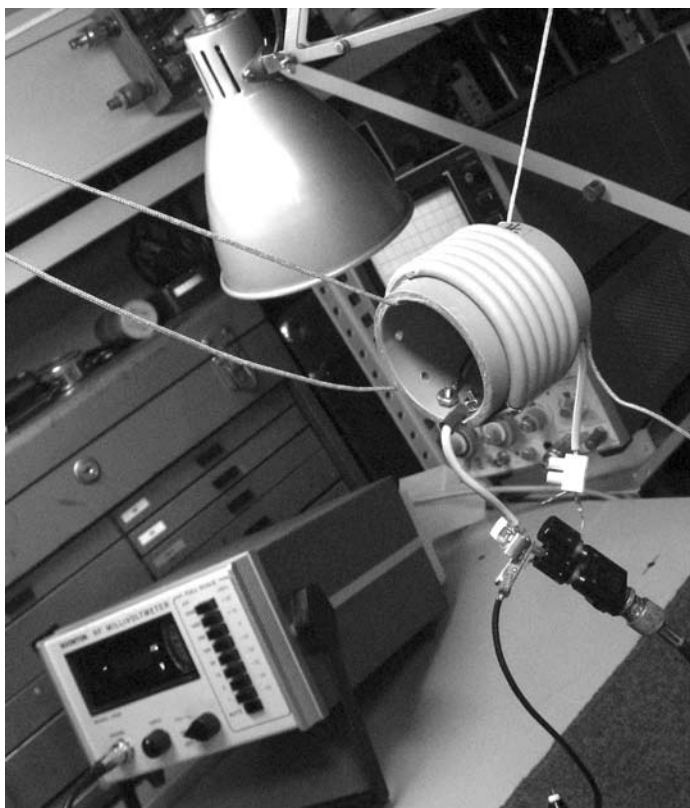


Figure 5. 10.1 MHz coaxial trap measurement.

low, the value of the capacitor that resonates the trap might be impractical. For example, a capacitive reactance of 377 Ohms at 10.1 MHz is achieved with a capacitance of 42 pF which is a reasonable value for transmitting capacitors. If the reactance is set to 188 Ohms, the capacitance is increased to 84 pF which also is a reasonable value. The choice of the inductance might be determined by other factors such as the overall length of the antenna. Large inductors make the antenna short. In general, select the inductance to achieve a practical value of C . Capacitors of value less than 10 pF in the HF bands are usually difficult to make and control.

The design of traps; two examples

The first example that I give is the design of a coaxial trap that is designed for operation at 10.1 MHz. This trap is made from winding a single coil of coaxial cable on a PVC coil form. There is no capacitor attached to the trap. The wiring diagram for the trap can be found in TCA Link, 3 by DG1MFT and the trap dimensions can be computed with the aid of a calculator given in TCA Hotlink, 7 by VE6YP. A photograph of this trap being tested for its Q value is

given in Figure 5. The trap uses approximately 5 turns of RG8-X coaxial cable on a PVC coil form 60 mm in diameter. It was found that the calculator gives the correct resonant frequency and that the traps do not require tuning since the range of acceptable frequencies is quite large as shown above. The Q of this type of trap is reported to be quite low. My measurements confirmed this as the Q of the coaxial trap in this example was only 101. This trap is useable but does not perform very well. The only variable in this type of trap once the coil form is selected is the number of turns of coaxial cable. Hence, the inductance and capacitance values are linked together.

The second trap that was made is shown in Figure 6. This trap is fabricated by winding several turns of RG8-X coaxial cable on a PVC coil form of 60 mm in diameter. This simply forms an inductor. The parallel capacitance is fabricated by connecting an un-terminated section of RG8-X coaxial cable across the inductor. This type of trap has a higher Q , 151, than the coaxial trap and is much easier to fabricate and tune. Its downside, see the diagrams, is

its size. Notice that the inductance and capacitance are independently set so the impedance level can be adjusted to any level.

A simple design procedure

A simple design procedure for making trapped dipoles is given in this section. Trapped dipoles really have their niche when you wish to feed the antenna with coaxial cable and the number of bands is limited to two. Trapped antennas get quite difficult to make when many bands are required. The performance also suffers. The simple design procedure given here is based on experimental development with no computer simulation needed. The procedure is as follows:

- Decide on the bands to be used: 40 and 30 metres in the example given here.
- Build a trap that meets the resonant frequency requirements and inductance given above. If you decide to use a coaxial trap, use the VE6YP calculator to determine the number of turns needed. Now, once the trap is tuned, leave it fixed as more tuning is not needed. The trap resonant frequency can be measured with a Vector or Scalar Network analyzer or with as simple SWR meter with Q measurement capabilities such as the MFJ-66, a coil set plugged into an MFJ SWR meter.
- Now build the antenna with the middle section cut to be 0.5 wavelengths long at the bottom

of the upper band, 10.1MHz in this example. Add some extra wire so this section can be tuned. The total length of the antenna should be set to approximately 0.45 wavelengths long at the lower band of interest, 7 MHz in this example.

- Now tune the centre section for the lowest SWR at the upper band and then tune the outer sections for the best SWR at the low band. Make sure to keep the antenna symmetrical so it is centre fed. No further tuning of the antenna should be necessary as the tuning will not be strongly interactive between bands.
- The SWR for the antenna will be quite good, approximately 2:1, but it can be improved with the aid of a simple antenna tuner located at the transmitter.
- Make sure to include a good balun that is located very close to the antenna feed point. If you use RG8-X coaxial cable, several ferrite sleeves can be used. For the 40/30 m band use seven sleeves from Fair-Rite part number 2643540002. These sleeves fit over RG8-X coaxial cable and offer good isolation in the HF bands. The ferrite is manufactured from #43 material.

Antenna example

I followed the above procedure to build a two band trapped dipole for operation in the CW portion

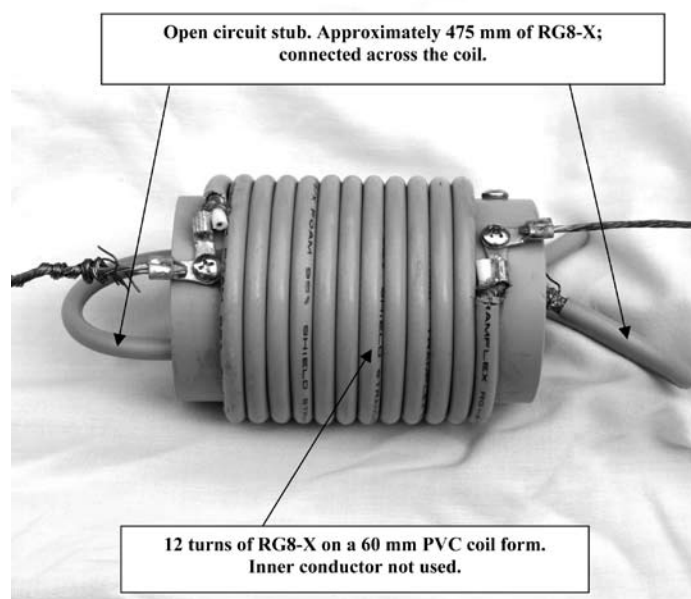


Figure 6. LC Trap, $f_0 = 9.6$ MHz, $Q = 151$.

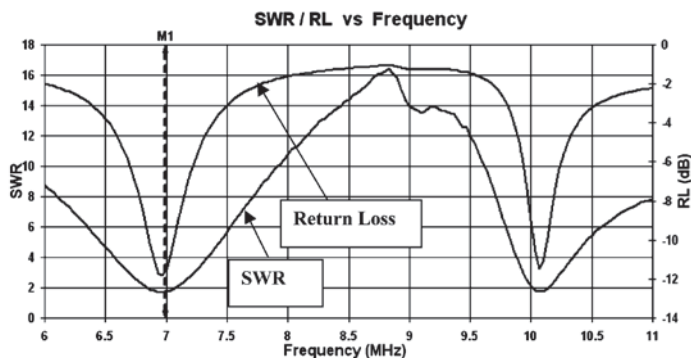


Figure 7. Measured SWR and return loss of assembled antenna at a height of 15 metres.

of the 40 and 30 m bands. The dimensions of the antenna are shown in Figure 1. $L_c = 14.75$ metres, $L_{Total} = 18.45$ metres and f_0 , the trap resonant frequency = 9.60 MHz.

The measured results for the antenna are given in Figure 7 where the SWR and Return Loss are plotted as a function of frequency. Notice that the SWR is less than 2:1 in the low end of the 40 m band and in the low end of the 30 metre band reflecting the my interest in CW and digital modes of operation. Your needs might be different so tune the antenna as needed to other frequencies. As shown in Figure 7, a Return Loss of approximately 10 dB at the operating frequency makes it quite easy to make a simple antenna tuner or use one that you might already own. I make my own tuners as I have lots of high quality parts that I have acquired at Hamfests over the years.

Conclusions

Trapped Dipole antennas can be extremely efficient even with the use of moderately high quality traps. However, the traps must be operated off resonance to achieve good performance and to reduce high capacitor voltages and large circulating currents. The traps used in this study are well suited for 100W operation with voltages well below the breakdown values for RG8-X. If higher powers are needed, high quality L-C traps are recommended that use very high breakdown voltage transmitting capacitors.

It also concluded that these antennas can be readily made at home with simple hardware as long as some guidelines are followed.

It will be necessary to have some method of measuring the resonant frequency of the trap. Only an estimate of the trap Q will be required. A good assumption for the design process is that the Q equals 100. If the trap Q is higher, losses are lower, not the antenna resonant points.

Another conclusion is that an accurate measure of the trap Q is quite difficult due to instrument limitations and loading of the trap by these instruments. Most network analysers do not have enough dynamic range to measure the impedance of the traps at resonance.

The author is now exploring the design and construction of a much better trap that uses an air wound coil and a high voltage transmitting capacitor. It is expected that no tuning of the trap will be needed since excellent calculators are available for the design of coils and the requirement on the resonant frequency is not great.

Acknowledgements

The author wishes to thank Doug, VE3XK for assistance with the literature survey and to Bryan, VE3ZRK for help with measuring the Q of these traps and other coils in his very well equipped laboratory.

Further study using TCA Hotlinks

Further information is provided with TCA hotlinks which are easily accessed via the RAC website. For this information, please visit <<http://www.rac.ca/tca>>. Hotlinks make it unnecessary to type URL addresses into your computer and provide you with calculators and other support that demonstrates the ideas presented in the articles. The

Situations Vacant

NZART Council is calling for expressions of interest for the following Officer Vacancies. All applicants must be NZART members.



1. Publicity and Marketing Officer

Applicants for this role can be located anywhere in New Zealand. The ideal person for this role would have experience in dealing with in areas of publicity and marketing. A job description is available at <<http://www.nzart.org.nz/nz/jd/jdmarketing.pdf>> or from NZART HQ.

The Publicity and Marketing Officer reports to NZART Council through the Officer Liaison Councillor.

2. Funding Officer

The Funding Officer is responsible to NZART Council for the co-ordination and promotion of fund raising activities for the good of the NZART. A job description is available at <<http://www.nzart.org.nz/nz/jd/jd-fund.pdf>> or from NZART HQ.

The Funding Officer reports to NZART Council through the Financial Management Group.

3. Moderator for Members Reflector/Forum

Applicants for this role can be located anywhere in New Zealand. The ideal person for this role would have knowledge of NZART history and experience with forum/reflector moderation.

The successful candidate will negotiate a job description and rules for running the reflector/forum with Council. Council are looking for best practices in running the forum and the ability to run a positive and successful forum.

This position reports to Council and the NZART Webmaster.

All positions are voluntary, however operating expenses will be refunded as per the NZART Policy on Officers Expenses.

Applications for these positions will be accepted from interested persons in writing with supporting documentation through the General Secretary, NZART, PO Box 40 525, Upper Hutt 5140.

This advertisement is authorised by NZART Council.

following hotlinks for this article are available on the RAC site.

- TCA Hotlink, 1
To Trap or Not to Trap. L.B.Cebik <<http://www.cebik.com/content/a10/wire/Trapqq.html>>
- TCA Hotlink, 2
High Q Coil Design VE6WZ <<http://www.qsl.net/ve6wz/coil.htm>>
- TCA Hotlink, 3
Coaxial Traps for Multiband Antennas; the True Equivalent Circuit. <<http://www.arrl.org/qex/Mueller.pdf>>
- TCA Hotlink, 4

An Improved Multiband Trap Dipole. <<http://www.i1wqr.lnradio.com/antype/ch37/chiave12.htm>>

- TCA Hotlink, 5
Trap Losses, W8JL. <<http://www.w8jl.com/Traps.htm>>
- TCA Hotlink, 6
Quality Factor of a system. <<http://en.wikipedia.org/wiki/Resonance>>
- TCA Hotlink, 7
Coaxial Trap calculator: VE6YP. <<http://www.qsl.net/ve6yp/>>

Until later, vy 73,

David, VE3KL

RadioTek; A day of radio technology

by Kelvin Barnsdale ZL3KB

On Sunday 7 November, Christchurch Branch 05 held the first of a series of fun days with a radio theme. The idea started at the beginning of 2010; as the club has its own building and amenities, why not set up a permanent facility to allow students, and adults, to come along and "play" with radio projects? This would be modeled on the successful ZL3 Buildathon program, but with a permanent base.

So, we applied to a local Pub Charity for a large grant, expecting the award would be cut back, and to our surprise we were awarded the whole amount. Community projects like this are in short supply; it seems you have a good chance to get all the funding you need. The money has now been spent on making 12 workstations which contain hand tools, glue guns, soldering stations and consumables, along with components and hardware to make enough electronics kits for several RadioTek events.

Our first RadioTek day was scheduled for 5 September; yes, a day after the big shake, so that had to be cancelled as the clubrooms had no power, and were slightly curved upwards at one end. Now everything is back in working order, (even if not quite straight), we opened our doors to our first group of students, ranging in age from 9 to 12 years.

The day started with a welcome and simple explanation on what radio waves are, and how radio gets around the world, finishing with an overview of radio frequencies; they are always amazed we have two radio receivers in our heads. Then we dived straight into the first electronics project, a steady hand game with a requirement to solder some basic components. The projects used a simple method of copper tape over self-adhesive instruction sticker, which was laid down on a small piece of MDF baseboard. Large components were glued down with hot-melt glue, and a front panel was added to give a good presentation.

When that was finished, many participants drifted into the radio shack and had a chat with Bob in Manchester on Echolink. We then gave another presentation to explain a little about Amateur radio and

how to get a ham license.

After lunch we started the second project, a simple AM radio for use with an earphone, and able to run from a single cell. They surprised us all by finishing this so quickly, and once they were all fully working we showed them how the radio would run from a battery made from a kiwifruit or lemon, and we also ran them from a little steam engine driven generator to add to the fun.

Some students had already made the AM radio from a similar event last year, so we gave them a different project; to make a speaker amplifier as the next stage. If they come back again we will have to invent yet another project for them!

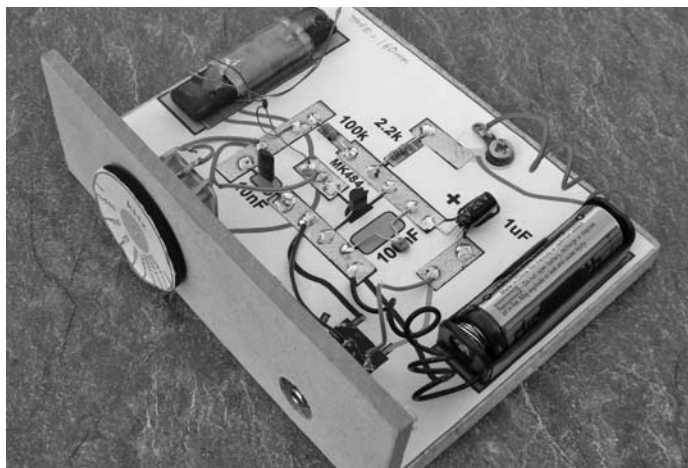
Having finished all the projects by mid-afternoon, we grabbed an HF dipole, a mast and a portable radio and took the group over to the local park to set up an "emergency radio station", and it was significant the park had lots of liquefaction damage remaining. All the students helped to successfully put up the mast and dipole and they all learnt how wires, feeders, ropes and legs can get tangled into knots! Unfortunately, there was little activity on any HF band, but we did make one QSO to ZL3AC, which was just across the road.

At the end of the day, we had thirteen very happy students and parents, going home with fully working projects. The team would like to thank itself; Des ZL3AK, Rory ZL3HB, Peter ZL3AQN Graeme ZL3GSL, John ZL3ADF, Brian ZL2BAT, Barry ZL3BMW, David ZL2IC, Kelvin ZL3KB, Jason ZL3LD and Aidan ZL3 not yet.

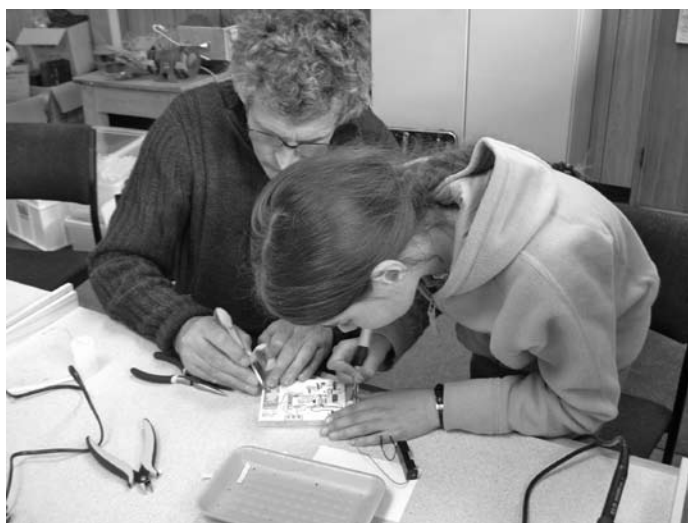
Further RadioTek days are scheduled for January, May, August and November next year, and if you want to help us spread the word; booking contact details for these are Rory Deans 03 3254181 or



Group of students.



One cell AM radio.



Father and daughter joint effort.

<rory1@xtra.co.nz> with a website at <<http://www.radiotek.org.nz/>>.

Along with the very successful ZL3 Buildathons, nobody can say Christchurch hams are not doing their bit to promote Amateur radio

in New Zealand!

If any group needs help please contact the author <zl3kb@xtra.co.nz>.

(See inside back cover for more images.)

βi

Radio in the New Zealand Post Office, Part 2

by Reg Motion ZL2LX

I was responsible for the design of the transmitter which was quite conventional, an EF91 crystal oscillator followed by an EF91 quadrupler formed the first module. the second module contained an EF91 as doubler and a QV04/6 as penultimate amplifier. The final module housed a QQE06/40 as final amplifier with an EB91 diode to monitor the RF output to the antenna. On a separate module an audio amplifier with compressor fed two type 807 valves as modulator. Compression took place when the level of input from the line to the subscriber exceeded that which produced 50% modulation thus preventing over modulation causing sideband splatter.

The quartz crystals used in the transmitter as well as the receiver were around 12-13 MHz which was as high a frequency as could be readily produced at the time. This was much higher than was in general use by the industry but was necessary to put spurious outputs from the transmitter and spurious responses of the receiver outside of the band of frequencies in use for the base stations (100-108 MHz). The extensive screening of each module also assisted in this regard.

Alan Ross and Eric Young carried out the design of the receiver. They attempted first of all to produce a TRF as that would have eliminated any spurious responses but they could not achieve the desired selectivity with stability so proceeded to a superhet design with 10.775MHz IF. Three EF92's as IF amplifiers were preceded by a three stage RF section using an EF91 first RF followed by two EF92 RF amps and an EF91 mixer. Interstage RF couplings consisted of separate shielded tuned circuits in the anode and grid of the valves concerned with capacitive coupling thus increasing the RF selectivity to the limit. In the IF stages separately shielded coils were again used but with an inductive coupling link between anode and grid coils of the interstage coupling. AVC arrangements were conventional, the large number of controlled stages giving very good control of the audio output. A noise silencer was included to remove spikes of noise such as might be produced by car ignition systems. The audio level to and from the subscriber via the underground cable was adjusted with stepped attenuators to

ensure accurate setting. Control of the transmitter receiver switching was initiated from the subscriber via a relay which changed over the antenna feed and the audio line then switched on either transmitter or receiver as required.

Collier and Beale produced 100 copies of this prototype base set for the Post Office and these proved to be very satisfactory in use. By 1952 this supply was exhausted and a further 100 sets were produced, this time by Radio Corporation (type 52).

As the demand for channels increased it was found necessary to reduce the frequency spacing between channels and the receiver selectivity required further improvement. A conventional LC filter was designed for inclusion within the antenna feed to the receiver but although this proved partially successful it's high pass-band loss (8dB) was too much for some services.

Coaxial line filters, designed and built in Radio Section in 1950, overcame this problem. These filters had to attenuate the received signal as little as possible while giving maximum rejection of the unwanted transmitter signal which might be as close as 300 kHz. This required that they be of as large a diameter as practicable and of high conductivity material. 250mm diameter copper tubing was used for the outer conductor and the result was a massive floor standing device about a metre high. The inner conductor had not only to be readily adjusted in length to tune to the required frequency but had also to be mechanically stabilised against temperature change. Bill Wilkin designed a compensation



Figure 1. NZPO Type 48 VHF Base Station.

mechanism of steel and aluminium tubes the expansions of which acted in opposite directions to keep the inner conductor length constant. In today's world Invar metal would be used for this purpose.

A further problem was the mysterious intermittent appearance of radio interference. Following a comprehensive investigation of this annoyance by Charles Sturton and Gordon Campbell the source was traced to intermodulation of two transmitters producing a signal on another received frequency (commonly 2F1-F2). This intermodulation was caused by any rectifying element within the immediate vicinity of the base station. It became known as the "rusty bolt" effect as rust where two metals were in contact was a common cause. Station buildings and antenna riggings were redesigned to eliminate this effect as far as practicable by either separating metal parts or bonding them firmly by welding or with short straps. We continued to learn.

My next assignment was to de-

velop a smaller base station transmitter as space in the buildings became a major issue. This was accomplished but not without a struggle to achieve the necessary RF stability in the relatively small space for a valved device. For various reasons including the increasing availability of suitable equipment from English sources, production of this design was not undertaken until 1957 and then only a small quantity were made.

Meantime the subject of the frequency stability of all radio transmitters which used the available frequency spectrum became of increasing international importance and I was assigned with others to investigate improvement of our own facilities. Where were we in 1950 when our investigations began? The next few paragraphs briefly cover the history.

Prior to 1930 most transmitters relied for their frequency control on the resonance of an inductance and capacitance in a self excited oscillator. While these methods made it easy to shift frequency at will they were subject to operator error in setting the frequency and to drift of frequency with temperature.

Since 1880 it had been known that certain solids could be caused to mechanically ring when they were excited by an electric charge and since the frequency of this ringing depended on the physical dimensions and the mode of oscillation of the specimen this ringing frequency could be adjusted to a required value. Known as the piezoelectric effect, the application of an electric charge across the solid caused it to change its shape with consequent damped mechanical vibration. This vibration could be sustained by coupling the solid electrostatically to a radio valve which then produced an alternating electrical voltage of the frequency of its vibration.

One of the solids which showed this electromechanical coupling was crystalline quartz, a commonly available material which

■ continued on page 14

was mechanically very stable and its use as a possible replacement for inductance/capacitance resonators was first suggested by W.G. Cady in 1921. Over the next 20 years Cady and others explored the physics involved and developed applications in frequency control of radio transmitters and in electronic filters. During the 1930s quartz frequency control became widely accepted for commercial transmitters and many radio amateurs experimented with it.

Of the many modes of mechanical ringing possessed by a symmetrical quartz solid one of the highest in frequency is the AT cut which vibrates in thickness shear mode and this became the popular choice for high frequency transmitters and fixed frequency receivers. A thin piece of quartz about 20 mm square held between two conducting plates took the place of the inductance/capacitance frequency control element in a transmitter and controlled the frequency of its output with much more exactitude than the elements it replaced.

There was, as usual, a down side. A change of frequency required production of a new crystal and obtaining these from overseas was a longwinded painful process in a world where postal communication and sea transport were the norm. High frequency radio communication requires many changes of frequency and the New Zealand Post Office had, of necessity, to set up at Radio Section its own quartz crystal production unit for this purpose.

The procedure used was to obtain a bulk supply of blanks and crystal holders from an overseas supplier then to manually lap these blanks to the required thickness by hand.

For this purpose one pressed the blank with the tips of two fingers onto a glass plate covered with a gritty cutting compound and moved it in a figure of eight fashion endeavouring at all times to maintain a uniform blank thickness. For the AT cut the frequency in kHz is approximately given by dividing 1670 by the thickness in millimetres. In the early stages the thickness was measured using a micrometer with the frequency of oscillation being tested in the final stages of lapping. Once on frequency the processed blanks were mounted in a holder which lightly clamped the blank at its four corners between metal plates which were slightly recessed to give a small air gap allowing room for the crystal to vibrate effectively. A typical mounting assembly was as shown in figure 2.

Such a procedure required considerable skill on the part of the operator as the frequency depended on the thickness and processed crystals which varied, even slightly in thickness over their surface oscillated erratically or not at all. Successful production was a time consuming process requiring patience and an even temperament. Nonetheless, it sufficed with little change of method throughout World War II in spite of the greatly increased demand from the Armed Forces. Measuring the crystal frequency was carried out using the method of interpolating between a 10kHz Standard Frequency series using an accurately calibrated 0 to 5000 Hz oscillator to measure the beat between crystal frequency and the nearest 10kHz harmonic. See figure 3. Apart from the time it took, this method was prone to errors in identifying correctly the frequency of the 10kHz harmonic in use.

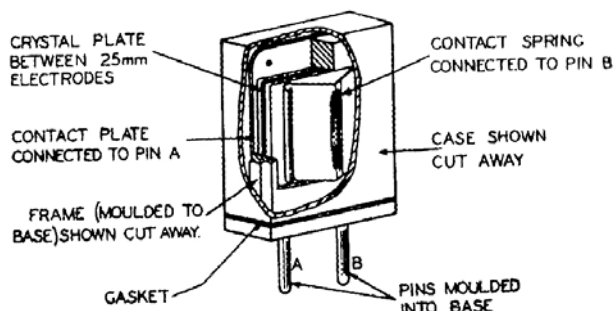


Figure 2. Quartz Crystal Holder used for manually processed crystals.

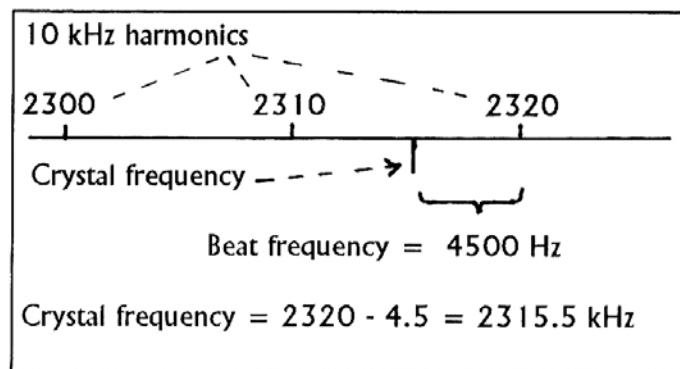


Figure 3. Original frequency measurement method.

Frequency measurement was tackled first and equipment was produced which gave a direct and unambiguous readout of the crystal frequency. The basic system followed one designed by the General Electric Company of England in which the crystal test oscillator output was successively mixed with selected multiples and decade divisions of a 1000 kHz standard crystal, the selection being readout on dials, with the last two digits indicated on an analogue meter.

We employed this method but substituted a digital frequency counter using a neon tube readout to indicate the last four digits. To the best of my knowledge this was the first commercial use of digital frequency counting in New Zealand.

In the photo of this equipment (figure 4) the left hand set of panels

contained the frequency measuring equipment starting with the tens of MHz selector (top panel). In use the left hand dial of this panel was tuned to the crystal frequency and indicated on its readout the setting needed on the right hand dial, which was a switch that selected multiples of tens of MHz produced from the inbuilt standard of frequency. The selected multiple was that which, mixed with the crystal frequency, gave a beat within the range 5 to 10 MHz. This beat was passed on to the next panel down where a similar process was carried out with the multiples of MHz to give a beat in the range 500 to 1000 kHz. Using the next two panels down in similar manner the beat frequency came into the range 0 to 10kHz and this was read out on the four rows of neons in the

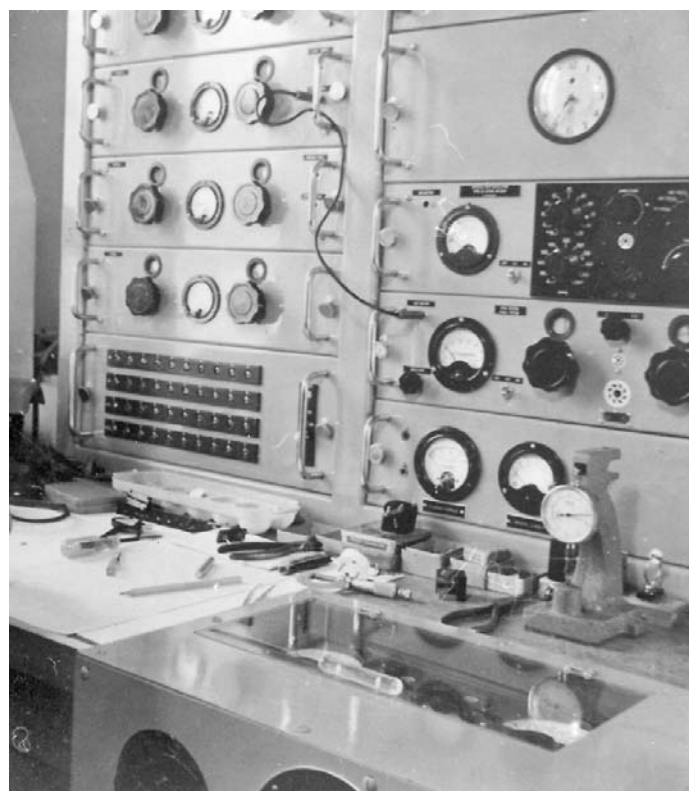


Figure 4. Manual finishing position. Frequency measuring is set at back.

bottom panel (the digital decade counter). The panels on the right contained power supplies, a clock driven by the inbuilt frequency divider from the standard crystal and, at the bottom, the test oscillator into which the crystal under measurement was inserted. This oscillator not only presented the crystal with its required operating input capacitance but also contained a facility to measure the crystal activity.

Replacement of the hand lapping with machine processing followed. The machine lapping processes in use overseas at that time were not applicable in New Zealand as they required production of a minimum of six crystals of the same frequency at any one time whereas in New Zealand we seldom were called for more than two crystals of the same frequency.

A crystal grinding machine was developed using a cup shaped diamond wheel across which the crystal blank was moved hydraulically on a chuck indexed forward in tiny increments by an electromagnetically driven micrometer feed to removed 0.00005 inches at each pass. The essential elements of the machine are shown in figure 5 with a photo of the completed set-up in figure 6.

To eliminate vibration the construction of the machine head was massive. The diamond lap rotated at 5500 rpm on preloaded ball races and the crystal blank, held to a vacuum chuck, was measured in thickness by a dial gauge as grinding proceeded. Coolant was continuously applied during this grinding process. The hydraulic pump, coolant supply and electrical control equipment were built into the base on which the machine head was mounted.

Two of these machines were produced and remained in use until 1978 when the Post Office ceased production of quartz crystal units.

Tighter frequency tolerances ruled out the use of a holder which clamped the crystal between metal plates as small changes in frequency occurred when the holder was jolted. More stable mounting methods were required.

Overseas development had pro-

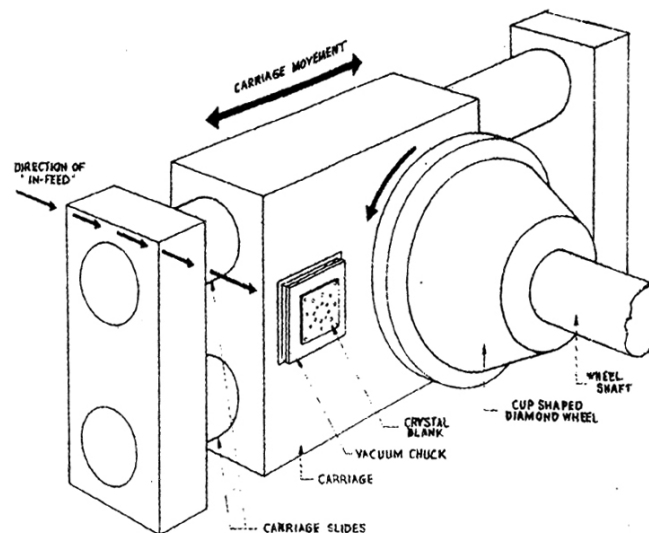


Figure 5. Essential elements of crystal grinding machine.



Figure 6. Author setting a crystal blank on a crystal grinding machine.

duced a method of evaporating or sputtering metal electrodes directly onto the faces of the quartz crystal and supporting the crystal with the wires connecting these electrodes to the base pins of the holder. Further improvements involving evacuating the crystal holder or filling it with an inert gas were also under development overseas. There was a need to accelerate our own development progress and to this end, in 1951, I was sent to study British processing methods under the auspices of the British Post Office which had an impressive record in the development of quartz crystal processing.

This was my first introduction to travel by air and the details remain with me to this day. I set out by flying boat from Evans Bay in Wellington on a journey to Sydney which took eight pleasant hours in seats of armchair size from which I could saunter around the craft

and spend time in a lounge if I liked. On reaching Sydney I had a quick taxi ride to join a British Airways Constellation which travelled overnight to Darwin where we breakfasted then left for London stopping on the way at Djakarta, Singapore, Calcutta, Karachi, Cairo and Rome. The whole trip took five days during which we spent two nights in the air otherwise stayed overnight at top hotels in Singapore, Karachi and Rome. At most stops we were taken for a sightseeing journey around the city concerned. Although I have been on many aircraft journeys since then I rate this trip as the best I ever had.

In England I was located at Dollis Hill laboratories and given the opportunity to study crystal production methods in use not only by the BPO but also by major private producers such as GEC and Marconi. Whilst there I was also

asked to study developments in BPO high frequency transmission methods such as the multiple unit steerable antenna (MUSA) used on the four channel HF radiotelephone system which connected UK and USA at that time. Altogether this was an illuminating three month stint

On my return to New Zealand, with the assistance of personnel from the DSIR, I became involved in producing plant for soldering electrodes to prepared crystals and evaporating silver electrodes onto them, then sealing them in metal cases or in glass envelopes (B7G valve type envelopes).

Following the grinding process two further stages of processing were used on the blanks to stabilise their surface. Minute free quartz particles and other foreign materials were removed by etching in hydrofluoric acid and washing in a detergent solution agitated supersonically.

Two small spots of a silver-loaded paste were then affixed to nodal point on opposite faces of the crystal and fired in place at 540°C. Silver wires were soldered to these spots then soldered to support wires which connected to the pins in the base of the holder. A British Post Office design of machine, manufactured by the DSIR, was employed for the delicate process of soldering the silver wires to the silver loaded spots on the crystal faces.

Following mounting on its base the crystal was ready to receive the electrodes which would allow it to be vibrated by electronic means (to oscillate). Silver was evaporated onto the crystal faces to form electrodes.

Evaporation of a metal occurs when the metal is melted in a high vacuum. The metal then leaves the surface of the melt in a stream which deposits on any cold surface nearby. Electrodes were formed by placing a mask, having a suitably shaped hole, between the molten metal and the cold crystal surface.

A machine for evaporating electrodes onto crystals was developed and manufactured largely by the DSIR. Figure 7 shows Fred Ashton

■ continued on page 16

Homemade 2m/70cm Dual Band Flexible Antenna

by Ian Boot ZL1TXZ

In the course of experimenting with reduced size antennas for handhelds, I was somewhat surprised at the different field strength variations obtained when using handheld VHF/UHF transceivers with commercial "rubber ducky" type antennas, even those of similar size. Large variations occurred when a simple counterpoise consisting of an alligator clip with two pieces of insulated wire attached to make total lengths of 495mm (19½") and 165mm (6½"), were attached to the metal antenna connectors. In some cases the field strength meter readings almost doubled and in others it made little difference; especially when the "rubber duckies" had been tuned to give a low SWR and they held true if the transceiver was being used in one's hand. By contrast, if the transceiver was being operated sitting on a desk and with a plugged-in microphone or speaker-mic, the counterpoise always improved the field strength. Measuring the SWR of any of the portable antennas was difficult since even the distance from the antenna to the SWR meter altered the readings. In the end I gained enough experience to correlate the placements and effects together with the field strength readings to feel reasonably confident in actually tuning my own "rubber duckies". I found that if one was using our Club's "MFJ Antenna Analyzer®", where one changes frequency by turning a knob, "hand effect" made big differences and the counterpoise was absolutely essential but, once attached, very stable reproducible readings were obtainable. It may be worth mentioning here, that I have never been able to obtain exactly the same readings between any SWR meter and the "MFJ Antenna Analyzer®", however, either can be used to produce a satisfactory range of readings to tune with, if one gives acceptable readings, so does the other, even though the figures are different.

I own two commercial "rubber duckies"; one is a 2m only Icom antenna, with 165mm (6½") of tightly coiled spring wire inside and which I use with my ancient, but reliable, Icom IC-2A. The other came with my recently acquired, tiny Yaesu VX-1 dual

bander, and has about 76mm (3") of usable element inside but I have no idea in what form. I was able to greatly improve the Icom antenna by checking it's SWR (horrible) and removing about 3½ turns of spring wire, bit by bit. The field strength meter rose markedly as

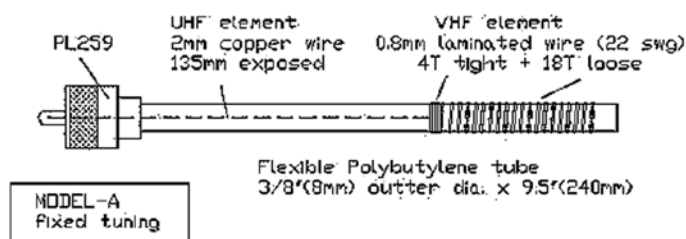


Figure 1. Basic design selected from website, as noted in script.

the SWR came down. However, as this was a 2m only antenna, I had a requirement for a better dual band antenna.

As usual, I decided to make my own and in fact I made a number of "roughies" without outer coverings, of various designs adapted from antenna information available on the web; most of these came with glowing reports from their designers, but in fact turned out to be no better in their 2m performance than what I already had, some decidedly worse! The best was called a "Home Brew dual band antenna" from an article in "Radio Fun", May 1994, and on the web at: <<http://www.qsl.net/ve3rgw/uvant.html>> and for anyone wishing to "have a go" it is worth reading the article; this is the basic design I started from.

The pictures show the not too difficult stages involved in con-

structing the final antenna. Prior to adding the heat shrink outer skin material, I carefully pruned it watching the SWR, having purposely wound it with a little extra wire. In practice, it is hard to gauge when you have gone too far. The frequency response rises as you shorten, it is only as the SWR begins to rise that you realise you should have stopped about 2 snips before! Not to worry, one of the effects of the later shrinking on an outer skin, is that it will lower the resonant frequency response and that is what happened here. For materials, I used some fairly flexible 8mm OD clear flexible silicon tubing as the base, a used BNC antenna connector, still with a short piece of thin coax crimped on and a piece of thin braided flexible cable for the lower half, 22# enamelled copper wire for the coils, a short length of grey

■ continued from page 15

using this machine in production. The lid of the metal vacuum bell is shown removed to display the jig in which the crystal was mounted between the electrode masks. Outside the masks were filaments that were electrically heated to melt and evaporate pieces of silver wire placed on them. Underneath the crystal was a thermionic valve assembly connected to the crystal leads to cause the crystal to oscillate once a sufficient deposit of silver electrodes formed on the crystal faces. The frequency of oscillation decreased slightly with increasing weight of electrode and this was tracked with the frequency measuring set in the background of the picture. Evaporation was stopped at the correct frequency. An elegant method of frequency setting,

In the base of the evaporating machine was the vacuum plant and measuring gauges. This consisted of a two stage mechanical pump assembly followed by an oil diffusion pump. The high vacuum was measured using a Pirani gauge. All processes were electrically controlled and a crystal could be finished in this machine in a few minutes operation.

The majority of crystals produced were in metal holders which were sealed under dry air conditions using soft solder. However some users, notably the defence forces, required crystals mounted in glass envelopes. This was a very delicate operation as the glass envelopes had to be sealed by melting and fusing the glass tube to the glass base using a specially imported machine which carried out the process by

rotating the parts while gas jets played on the seal. Normally when glass is sealed to glass the heat source is only gradually removed which allows any strains in the resulting joint to be alleviated. With the crystal inside this could not be fully achieved as the soldered joints of the crystal wires had to be prevented from melting thus a common fault in this type of holder was later cracking of the sealed glass joint when the ambient temperature changed. The skill of the operator was vital in successfully carrying out this sealing operation.

Our experience with wartime supply difficulties and delays demanded that we become as independent as practicable. Steps were taken to obtain an emergency supply of raw quartz and to assemble the equipment needed to

produce our own blanks if necessary. With the relatively small quantities required such production would have been at a high cost per blank. Thankfully New Zealand did not suffer another major war and while this equipment was kept as an insurance it was never needed in practice.

By 1954 development work on crystal processing was essentially complete and the plant under the able direction of Senior Radio Technicians continued to produce New Zealand government requirements until 1978 at which time private production facilities were well developed in New Zealand and government production became unnecessary. The Post Office Crystal Processing Laboratory was closed down having rendered 40 years of service. To be continued ...



Figure 2. Completed homemade "rubber ducky" antenna, ready to use.



Figure 3. Lower element made from fine braid (could be solid copper wire) ready to solder to centre of fine coax from "used" BNC connector.

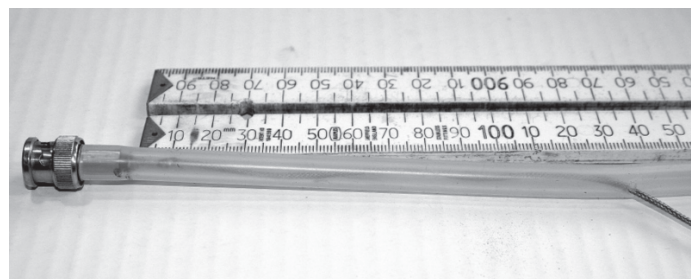


Figure 4. Braid brought out ready to cut and solder to 22# wire for coils.



Figure 5. Ready to mount on analyzer and trim excess wire from top. Short poly-butylene tube hot-glued to BNC connector and to flexible silicon tubing at base.



Figure 6. Completed antenna after SWR trimming and then heat-shrink covered, end-cap added.

polybutylene tubing and two sizes of heat-shrink tubing.

When completed, and using the setup shown in photo ??, but taken outside, the results for 2m are shown in Table 1.

Table 1

MHz	SWR
144	2
145	1.25
146	104
147	1.6
148	1.3

Using the Club's MFJ Analyser the final SWR results, antenna mounted directly on top and with the clipped on counterpoise are given in Table 2.

Table 2

MHz	SWR	MHz	SWR
144	1.4	430	1.5
145	1.3	431	1.1
146	1.5	434	1.4
147	1.6	435	1.5
148	1.7	436	1.5
		437	1.6
		438	1.6
		439	1.7
		440	1.8
		440	1.8

The effective radiated power indicated by my field strength meter, located in the same position from which I compared the other antennas, proved that this little "Rubber Ducky" was the best of all those I tested. β

From Ian ZLITXZ

Coming Up

It is hoped to print the following articles in the next issue of *Break-in*:

- Full-bridge connection of LM386 ICs
- Amateur use of time domain reflectometry.

Copy is needed urgently.
The cupboard is virtually empty!

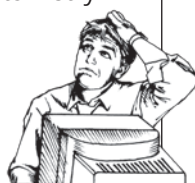


Figure 8. Setup using SWR meter, antenna is taped to a piece of 'Marley' rectangular PVC downpipe. The dual counterpoise mentioned in the script is clipped on. The actual testing was done outside, away from the metal tool board influences as shown in the picture.

Longer Wavelengths

Con Wassilieff ZL2AFP
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Introduction

As Bob ZL2CA mentioned in his last column, I will be column author for the foreseeable future. The format might change a bit compared with Bob's as my radio interests tend to be more of a technical nature (mostly software development). I would like to take this opportunity to thank Bob for his contributions in the past; it will be a hard act to follow. Depending upon source material available, the column may become somewhat occasional, so any copy for the column would be much appreciated.

600m activity

The ZL low band net which meets on 3666 kHz at 8.30pm on Thursdays is currently in recess until the end of January. However, Murray ZL1BPU is transmitting from his new MEPT (Manned Experimental Propagation Transmitter) at various times on 508.0 kHz, mostly for the benefit of VK receivers, who are currently authorised to send "experimental" transmissions only, QSO's being disallowed under the present regulatory regime.

Murray's new transmitter consists of a DDS with programmable message content, consisting of human-readable modes (Castle and multi-tone Hellschreiber) sent using QRSS3 (3 second dot lengths), and a Class-D amplifier powered from 12 volts, with about 18 W output. The PA design is from Graham ZL1QM. Reception in VK can be confirmed by visiting the various "grabber" sites on the internet. For example, the "Berry Mountain Grabber" in New South Wales operated by VK6DDI is often tuned to the 600m band^[1].

The WIA is authorised to give out

scientific licences to their members to transmit on 600m, but for some reason have imposed a requirement for Morse code proficiency. Steve Olney VK2XV, the inventor of the incremental frequency keying (IFK) modulation technique, does not have the requisite Morse code proficiency but is hopeful of obtaining a scientific licence in the near future. The situation in the UK is similar, with amateurs having to obtain a "notice of variation". In many respects we have it good over here in ZL.

Current VK 600m activity has been WSPR (Weak Signal Propagation Reporter) around 508kHz by Nick VK2DX (operating as AX2VKX), and Dimitrios VK1SV (operating as AX2VKY).

Even longer wavelengths

The November-December 2010 Longer Wavelengths introduced the successful VLF transmissions of Stefan DK7FC, at carrier frequencies of 8.97 kHz, 6.470 kHz, and 5.170 kHz. Since then, Stefan has made further transmissions and can claim a distance record of 2873 km, with the signal being positively

identified by Chris 4X1RF in Israel, with a good signal to noise ratio on 8.970 kHz, and fragments of the signal received on 6.470 kHz. The signals were received by 23 stations in nine countries and two continents.

Now, we are not talking about Morse code chat or even QRSS3 here; the dot lengths used were 600 seconds (10 minutes) long! The mode was QRSS600, using continuous FSK to save time by avoiding unnecessary gaps between symbols, with frequency shift of only fractions of a Hertz and a GPS locked carrier to maintain the extreme stability required when integrating the signal out of the noise over a long time period.

The antenna was a 300m long wire held aloft by a kite, with a loading coil of 190 mH inductance to resonate the system at 8.97 kHz. Power input to the antenna was about 500 W producing an antenna current of 1A, with 58 mW ERP, which is pretty good considering the antenna is still a very small fraction of the wavelength involved (33km). The earth system consisting of a copper earth rod and a large copper plate sitting on the ground, conductivity being assisted by melting snow.

Reception in some instances was by means of an earth antenna system, which was found to produce better signal to noise ratio than an E-field active antenna. Here is an area for some experimentation.

SAQ on Christmas Day

The VLF transmitting station SAQ at Grimeton Sweden transmitted its regular Christmas message at 0800 hours on Christmas Day. SAQ was commissioned in 1924 and uses an Alexanderson Alternator to transmit Morse code on 17.2 kHz, with power output of 200 kW to an impressive antenna system. Jim M0BMU reports that reception was good (RST 599) using a loop antenna oriented N-S and an IC-718 transceiver with transverter. The transmission sequence was:

- 0743 Tuning up – "vvv de SAQ"
- 0800 Broadcast message re: Aerial coil upgrades and Christmas greetings
- 0807 Shut down

Nothing was heard, nor seen using visual modes (Argo) at my QTH (no surprises there!).

VLF in ZL

Kevin ZL4MD provided this reminiscence about "whistler mode" experiments in the 1970's.

"There was an interesting research experiment here in Central Otago many years ago – probably 1970s. Big American trucks arrived with a high-power VLF transmitter, winches and a barrage balloon thing etc. One site tested was in the forest near Naseby. I also think that tests were done from near Alexandra. Basically, a very long vertical wire was poked up into the night sky and test transmissions were done at about 6 kHz. Some tests were also conducted at about 3.5 kHz. A newspaper report said that this was the lowest frequency radio transmission in New Zealand to date. I recall putting a wire onto an audio amplifier and listening to the strong steady tone. This probably fuelled my later interest in VLF/LF work [fun].

The object of the exercise was to poke a whistler mode signal into Alaska or somewhere in the USA. From memory, the experiment was successful. There was a big write-up and photos in the Otago Daily Times. I cut the story out but, like many things, cannot find it!

Also, I don't recall who the participants were. I think it may have been an American university and perhaps the physics boys from Otago U. I don't think that the then DSIR were involved."

What else to receive at VLF?

A receiving setup consisting of an active antenna (for QRM reduction) and a soundcard, with a freely available Software Defined Radio (SDR) program such as Winrad to demodulate the signal will provide reception of the radio spectrum, from the lower limit of the soundcard (usually 30 Hz or so) up to the Nyquist frequency of the soundcard (half the sampling rate). For a typical AC97 soundcard that comes with virtually all computers, this will provide an upper frequency of only 24 kHz, assuming a maximum sampling rate of 48 kHz. This upper limit



Figure 1. ZL1BPU MEPT signal on 508.0kHz as received by ZL2AFP.

can be extended to 48 kHz with one of the readily available audio quality USB soundcards with a 96 kHz sampling rate. Soundcards are now available that have 192 kHz sampling rate but I have not tried any of these.

Once you get the signal into the computer there is scope for digital signal processing to improve signal-to-noise ratio, demodulate exotic modes such as Minimum Shift Keying (MSK), etc. Within the range of a 96 kHz soundcard is the Japanese frequency and time standard JJY40 at 40 kHz. With crafty software this can be used as a reference for all sorts of programs that require frequency stability (such as reception of extreme narrow band signals such as Stefan's above).

I am currently using a version of Winrad called WRplus^[2], which also provides audio output, unlike Spectrum Laboratory^[3], which provides only a visual indication of the spectrum. If only QRSS or other visual modes are intended to be copied, then Spectrum Laboratory will be sufficient. Figure 2 shows a portion of the WRplus screen, with the spectrum in the lower pane and the spectrum over time (waterfall plot) in the upper pane.

To the left can be seen the Russian Alpha stations at 11.9 kHz, 12.6 kHz, and 14.8 kHz. These are a navigational aid somewhat along the lines of the US Omega stations. Between 16 kHz and 25 kHz are MSK and FSK stations used for various purposes. The strongest of these is NWC at North West Cape, Australia, operated on behalf of the US Navy by the Royal Australian Navy and reported to be used for submarine communications, with a radiated power of 1000 kW. All signals visible above (especially NWC) can easily be heard with a low QRM receiving setup.

At 40 kHz is seen the Japanese frequency and time standard JJY40. The unsteady signal between 28 and 29 kHz is local QRM. Even with an active antenna located as far away from electrical wiring as possible, QRM is an inevitability in a suburban environment. A broad band active antenna is also prone to some intermodulation from signals higher up the band and

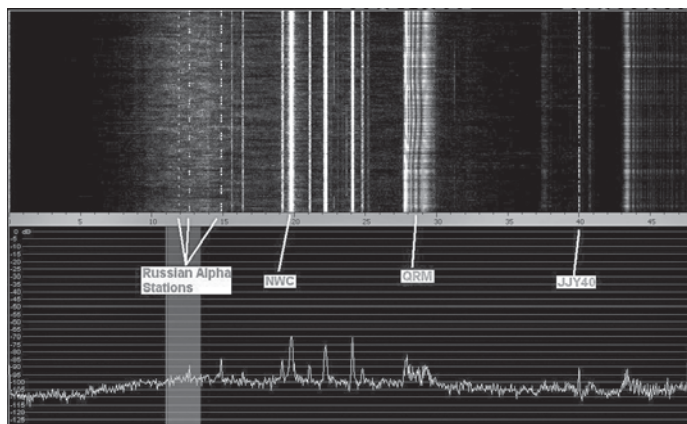


Figure 2. Portion of WRplus display, showing waterfall (upper) and instantaneous spectrum (lower).

it is difficult to separate out real signals from phantoms.

Reception at frequencies higher than 48 kHz will generally require a conventional receiver, or perhaps a Software Defined Receiver which can be a very simple mixer with in-phase and quadrature outputs for subsequent processing by programs such as WRplus. I hope to report on my experiments in this area at some later stage (whether successful or not).

Awhitu former NDB antenna

With the closure of several Non-Direction Beacons (NDB) by Airways Corporation one of these has become available for possible amateur radio use. The NDB (call-sign OT) at Westpoint, Auckland has been decommissioned but the antenna mast and station building have been left intact. Graham ZLIQM found this mast on a farm at the top of the Awhitu peninsula. He and Murray ZL1BPU made an exploratory visit to the site recently.

The mast is 40m tall (¼ wavelength on 160m) and is understood to be US-made. It sits on four compression insulators the size of footballs about 3m up, and is prevented from falling over by a

fifth compression insulator up the other way within the mast, pulling it down. Unfortunately, the 50m long ground radials have been removed. The main shack also remains, complete with electrical power and some accessories (not including any equipment, alas).

Murray notes that there are several problems still to be overcome. A band stop filter for the BC band is needed as the mast is not too far from Henderson. Lack of decent ground at the antenna means that sweeps of the antenna from the base and the shack on a temporary feeder were less than ideal. However, an adequate temporary ground should fix that. Murray notes that donations of wire would be very welcome!

The main feeder between shack and mast has been damaged and this will need to be repaired. A VNA sweep from the shack end indicates that the last 10m may need replacing. Connections to the antenna itself will be difficult (as they are 4m up), and matching circuits for the various bands will need to be portable/dismountable, and manual tuning from the antenna for each band is really the only practical method for a temporary setup. The site is quite



Figure 3. Awhitu 40m tall mast.

remote and would make a grand remote operating site, even without the mast, as it is quiet and well equipped. Further investigations are planned after Christmas.

References

- [1] <<http://goo.gl/Dnjmk>>
- [2] <<http://wrplus.altervista.org>>
- [3] <http://dl4yh.fssl7.com/speclab/install_spec-clab.zip>

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Understanding LF and HF Propagation

Free e-book

Steve GOKYA and Alan G3NYK, of the Radio Society of Great Britain's (RSGB) Propagation Studies Committee, have released a free e-book called "Understanding LF and HF Propagation."

In 2008/2009 Steve and Alan wrote a series of features on LF and HF propagation for the RSGB's "RadCom" magazine.

You can download your free copy of "Understanding LF and HF Propagation" at <www.gokya.blogspot.com>.

VHF Scene

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Greetings for VHF Scene 2011

The VHF and SHF amateur bands continue to show good activity growth in New Zealand. Not only in contests, but with the many activity sessions that occur thought out the year. Radio communication, the wonder of it along with the fascination still aspires many today within amateur radio. This activity report ends at the 31st of December 2010 and we wish you all the best for 2011.

6 m reports and DX activity

Despite the dismal SFI so far in Solar Cycle 24, some interesting propagation and stations are starting to come through on 6 m. Report from the far north of ZL1, "I've been working a handful of VK6s, two DUs, one scratchy QSO to JA, half a contact to W6, and a couple of "maybe heard" from W4 and W5 (very weak CW, with just the odd letter readable here).

The ZL8X and ZL7A DXpedition were both worked on 6 m during the many instances of very short hop Es propagation that has been floating around ZL. Several times I have heard ZL2, 3 and 4 weakly thinking it was backscatter only to turn the beam generally south and find them pouring in at S9!

A few days ago Rod, ZL3NW commented that he thought K6QXY was a local when he tuned across his signal. K6QXY has been very weak in ZL1 while coming in well to ZL2 and ZL3. 6 m band propagation can vary from location to location around New Zealand depending upon the propagation at the time. Reported a few months ago, was one station from ZL2 working many JA's in a pile up, while the rest of ZL was not?

Rod, ZL3NW reports from Christchurch, "The ZL8X made a big appearance on 4 December with typical Sporadic E and signals varied from weak CW to strong SSB. They had 70 contacts in ZL and VK. Several were worked on both transmission modes. I caught up with ZL7A on 8 December, as did several others.

I have had three contacts with Bob K6QXY and all due to his diligent reporting the reception of ZL Video and when strong enough he starts calling in the ZL direction. Contacts made on the 11th

and twice on the 13th, two hours apart. Typically the openings are very short, although I believe the band is open longer and it is the propagation spot that moves.

This is supported by Bob K6QXY observation of different ZLTV frequencies received around the opening period. Typically the signals are just readable above the noise floor, and for a short time he had strong local like signals.

15 December was another interesting day when Joel KG6DX was worked and his beacon heard for some time. Overlaying this was an opening to JA1 and several JA1 stations worked all on CW, but some local ZL3s worked the odd one on SSB. During all this period the band was still open to Guam and later I received an email from Joel KG6DX telling me he copied me for three hours.

Across to the west coast of the mainland, Bob ZL3TY reports, "For me the most interesting thing of late has been the number of times DU has been worked. DU7/PA0HIP has been worked here on five days in December, mostly very weak signals but once on SSB. I have not had anything from the USA and I was not at home when the Guam/JA opening was on. Lots of sporadic E to VK and on one day had propagation to VK1, 2, 3, 4, 6, 7, 8 and FK8. Much of the DX worked was with CW; a much under-rated mode for VHF DXing.

I dug out my old log for 1999, eleven years ago. The DX started earlier, in October, then in November openings to JA, USA, XE, VK, and FK. December was great, plenty of JA, USA, Caribbean openings and on 14 December, twelve countries worked! The current solar cycle is well behind, hope it catches up soon!

And from further south Paul ZL4PW reports, "I was lucky enough to work JA on 6 m CW on 15 December an around 0630 I came into the shack from dinner and checked the VK Logger. I saw that ZL3JT, ZL3NW and others were hearing AH2G beacon on 50.004 so I had a listen and was surprised to copy it also. Shortly after, the ZL3s were working a JA that I could not hear, so stayed tuned and clearly copied JA1SFL calling CQ. Ever being the optimist I thought I might just stand a chance with 100 W and my 3-element SteppIR® and after a few calls and exchanging of pleasantries, we completed the QSO. I also heard him calling SSB later but he was working VK and missed out. Since then, the ZL3s and others have been hearing KH6 and DU but have heard nothing more than ESP-level signals from here.

23 December, ZL1RS to OA4TT on CW 429 at 10 949 km! Also N5JEH 11 354 km, K6QXY 10 460 km on 25 December.

2 m DX reports

Mid-November 2010 saw enhanced tropo conditions the length of New Zealand. Bob ZL1RS in the Bay of Islands reports the reception of the Christchurch ZL3VHF 2 m band beacon on 144.285 MHz at 926 km with a meteor scatter burn. Bob quotes, "I think it was a big long meteor burn rather than anything else. Whatever it was, it was a good one as I could copy the CW from the speaker in the shack while spraying the front lawn 20 metres away! Later in the morning worked Rod ZL3NW at 915 km at -23 with the JT65 digital mode.

Rod ZL3NW reports from Christchurch, "I noted Bob ZL1RS was hearing the Wellington ZL2UHF beacon on 2 m and earlier he had heard a burst of the Christchurch 2 m beacon; maybe MS enhancement. Anyway as I was hearing the Wellington beacon also, Bob suggested we try a direct contact using JT65b. Almost straight away I could see MS burst enhancements of Bob's JT65b digital signal but I suspect this was the cause of no decodes for some time. However given some time later we exchanged all the necessary information for a

complete contact, I even received Bob's 73. What were interesting, my good decodes from Bob were with signals down around the -29 -30 dB area; real EME signal levels. At times I had signals up around the -18dB and higher with good clear signal traces on the screen but typically no decodes. I was using 100 W to a single 12 element K1FO Yagi at my home QTH RE66HO. QSO at 2325 UTC on 11 November.

To Northland once again, "Yes, Rod and I did have a direct QSO via JT65b yesterday as spotted on the logger. There has been tropo down the country the last two days. Again, as with last week, it appears to be more prevalent down the west coast side of the North Island as the signal from the Wellington 144.275 MHz beacon is enhanced more than signals from Palmerston North just 8° bearing to the east.

Rod appeared mid-morning, and as the Wellington 2m beacon was still audible we had an attempt on JT65b. While there was some enhancement to Wellington, there was nothing special from Rod. The signal peaked a few times enough for a QSO and I suspect the enhancements were from aircraft scatter, or maybe aircraft enhanced tropo. We have seen this before but the attempts at a QSO using JT65b were upset by the Doppler spread meteor pings interfering with the direct signal. Yesterday there were several periods without MS pings and we finally made it. BTW, I can "see" Aircraft Enhancements on Spec Lab, the direct signal is paired with another signal 5 to 10 Hz away as a Doppler shifted signal appears for 20 seconds or so via a reflection off the moving aircraft.

I believe Rod ZL3NW and I worked on 2 m JT65b via peaks in the signal from several aircraft enhancements over the 20 minutes or so that it took to complete the QSO, but probably with the tropo duct helping.

ZL to VK on 2 m

Another 2 m band tropo opening to VK for the season, this time favouring ZL3 once again! Bob ZL3TY worked VK4OX, VK2DVZ,

VK2BCC, VK2ZT, and VK2KOL, on and around 24-27 November. On 25 November Nick, ZL1IU worked VK2ZT.

What appeared to be Sporadic E or Es opening on 2 m, occurred on 19 December in the early evening with Nick, ZL1IU working twelve VK2 stations with VK2BLF reporting his first ZL contact and faded at last over.

Mt Climie 23 cm Band 1292 (200) FM repeater is on air.

On 29 December 2010, Simon ZL2BRG, Peter ZL2HM, Mark ZL2UFI and Jens ZL2TJT from Branch 63 NZART installed the new 1292 MHz 23 cm FM repeater at Mt Climie.

The 1292 MHz TX and 1272 MHz RX consisting of the following: Mini Kits Australia EME72B RPT using a Tait VHF IF, TX power is a Mitsubishi RA18H1213G module. The duplexer is from duplexers. eu model MDF1-6-23CM. The antenna is a 9 dBd vertical coaxial co-linear based on a design by Mike Collis WA6SVT and Peter Williams ZL2ARW. Feeder coax is 8m of LDF-450. RX bandwidth is flat to -3dB points of ± 7 kHz. RX sensitivity at antenna 0.2 μ V (-122dBm) TX power at antenna is 12 W (95W ERP) 230VAC to 13V Twin Power supplies with battery backup. Repeater controller is a VK5DJ design.

Operational notes: The 1292 has a beacon mode every 30 minutes with AFSK Morse identification. TX has 88.5Hz CTCSS tone while repeating and no tone in beacon mode. CTCSS on repeated audio only! TX lockout timer is 30 minutes. Mains fail alarm is a long tone replacing the normal pip at the end of the tail. Many remote control trustee features available.

Branch 63 acknowledges the work done by the following members: Simon ZL2BRG Building and tuning of the RF deck MiniKits EME72B RPT; John ZL2TWS building the antenna, duplexer, Tait VHF IF deck and PSU design; Jens ZL2TJT building the PSU rack, batteries, antenna pole and rack heating; Paul ZL2UGR complete construction and programming the VK5DJ controller; Neil ZL2TNG supplying IF parts and

controller; Chris ZL2DX supplying of RF components and test equipment; Phil ZL2HF antenna mounting hardware; Peter ZL2HM coax and connectors; Mark ZL2UFI administration and project management. (John ZL2TWS on behalf of Branch 63)

December VHF Field Day contest 2010

VHF Field Day, our main contest event of the year was held on the weekend of 4-5 December 2010. Weather conditions reported were excellent around the country, along with reasonable band conditions reported. Numerous field stations were set up in remote high hill top sites, along with many active home stations.

From the far South we had David ZL4DK and Terry ZL4TAE operating from Swampy Summit, near Dunedin using the club call ZL4AA. The team reports numerous 23 cm band contacts into Christchurch. Well done to the Southern team for operating from a great elevated location.

From the central and lower North Island districts, a number of field stations were active from the east to west coast. Warren ZL2AJ operated station ZM2M at Te Awaputahi (near Herbertville) at grid square RE89FO. The ZL2AS Hastings Branch from Omakere and Laurie ZL2TC Laurie from Salisbury Rd. Centrally located; the team of ZL2KO for the Palmerston North Branch from Ruahine Ranges.

From ZM2M; VHF field day brief report from Warren Harris, ZL2AJ; I setup a solo operation at Te Awaputahi, east of Dannevirke. The hill is 580 m ASL and had a good run into Hawkes Bay, while being over 100 km south of Napier, was good for points. Operated out of the car with various beams and Omnis on the hilltop. The bands had moments but were down on previous years. Highlights included working ZL8X on 6 m, and working ZL4AA on 2 m. Lowlights included the wind on Saturday evening, I had to abandon the tent and sleep in the small radio room. Whilst onsite before the contest kicked off I established an APRS digipeater on site. ZL2AS-2.

Mike from the ZL2KO team, with



Ray ZL2TAL operating 5.76 GHz December VHF FD 2010 from Mount Taranaki.



Harry ZL1BK, Mount Ruapehu in the December 2010 VHF FD contest.

contest report, "We setup on the Ruahine Ranges above Dannevirke about 1200 m ASL. Good clear line of sight paths to majority of the south of the North Island. Plenty of good 2 m contacts to Christchurch, Auckland, Taranaki, Lower Hutt, also locals in Hawkes Bay and Palmerston North. Also contacts on 1296 MHz as well. Team of five, also some extra help on Saturday. Operators were; ZL2KP (President Branch 20) ZL2SGA, ZL2FX, ZL2KG, and ZL2UKW.

Simon ZL1SWW reports from Cape Rodney, "Our site is 375 m ASL with good views to the south and north. Our team consisted of Mark ZL1BNO and Simon ZL1SWW. Simon arrived on site and spent about two hours, setting up seven microwave bands all lined up along the fence line. However Simon did manage to work some VK4's on 6 m before the contest start, but did mention that the ZL contest was on. They all duly hung around to work us up on 50.150 MHz during the correct time period. The highlight

was working ZL8X DXpedition on the Kermadec Island on 6 m along with the ensuing VK pileup, all wanting to work ZL8. Southern most stations on 2 m would have been ZL2DX and ZM2M.

Rod ZL3NW from Christchurch was active and reports good long haul contacts up to ZL4 on 23 cm. As reported, "I operated from my home station for the 2010 Field Day just to support those who were out in the field. I operated 6 m 2 m 70 cm and 23 cm and found conditions south excellent and at times quite good to the North Island. The greatest distance worked to the north was ZL2AS and to the south was ZL4LV. The ZL4AA team had excellent signals on all bands.

Brian ZL1AVZ operated bands to 24 GHz from Muriwai on the west coast out of Auckland. Best DX on 24 GHz (1.2 cm) was to ZL1BQ Maunganui Bluff at 146 km. Harry ZL1BK operated from Mount Ruapehu, at the top of the Bruce road and operated 2 m, 70

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Around the Branches



Branch 74 Wellington VHF Group

Digital Amateur Television (DATV) update

The data compression, inherent in all forms of digital television, permits the simultaneous transmission of many video and audio streams in the bandwidth previously occupied by one analogue television transmission. This technique is a feature of Broadcast digital television.

On Saturday, 4 December, 2010, a group of Wellington and Hutt Valley Amateurs simultaneously multiplexed four video and audio streams into one digital television transmission, using low cost equipment.

The transmission was centred on 1282 MHz, in accordance with the NZART bandplan (page 4-11 of the latest *Call-Book*), and occupied 1274 to 1290 MHz, the same bandwidth as one analogue

FM television transmission. The DVB-S modulation format was used, which is receivable on an unmodified Digital Satellite TV set-top box.

Two weeks later, the same team achieved a second milestone, further reducing the bandwidth by one half, using the DVB-T modulation format, which is receivable on a Digital Terrestrial TV receiver, or set-top box.

The first transmission was on the 70 cm band at a power level of 5 mW; the second transmission was on Channel 39 (614 to 622 MHz) at a power level of 10 µW.

Further development and testing is planned, to confirm the compatibility of the transmissions with in-band and adjacent-channel services.

The team was led by Doug ZL2TAR, assisted by Gavin ZL2TVM, Dick ZL2TGQ, and Phil ZL2TIQ.

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cm, 23 cm and 6 cm bands. Harry with only 1 watt on 23 cm was able to work the 425 km path north to ZL1BQ. Harry with a 1 m dish on 6 cm band was working the same 425 km path at S7 on the peaks with both SSB and FM.

From north Mount Egmont, or Taranaki, the teams of Ray ZL2TAL and Ted ZL2TAX operated 144 MHz, 1296 MHz and 6 cm only from the new, recently built, tourist viewing platform. At 960 m ABSL what a great place to operate amateur VHF radio.

From Ray ZL2TAL, "Stations worked on 1296 and 6 cm were ZL1BQ, ZL1SWW, and ZL1AVZ. Harry ZL1BK was romping in on 1296 as always from Ruapehu. My gear, ICOM 1297A/E with 10 W O/P to 23 element loop Yagi. Reason for 1296, to compare signals with 5.7 GHz, but it worked out that after inquiries for 1296 came forward and on further discussions with Ted it was decided to set up a completely separate station with my call sign ZL2TAL, so things became more

serious. Brian ZL1AVZ's 1296 signals were ranging with lots of QSB from S5 to 60 dB over 9 on FM. My amateur radio ticket was obtained back in March 1963 close to my birthday, which now makes me 47 years in the game, and I am 85 at the moment and 86 next year. Regards from Ray, ZL2TAL

The Auckland VHF group contest team of ZL1BQ, operated from the far north at Maunganui Bluff. Operators were Vaughan ZL1TGC, Peter ZL1UKG, Laurie ZL1ICU and scribe. ZL1BQ team operated all VHF and microwave bands to 24 GHz.

2011 VHF-UHF-SHF Contest Calendar

DX Weekend Contest; All bands 50 MHz and up. Saturday 5 and Sunday 6 February.

Low Band Contest: All bands 50 MHz to 440 MHz. Saturday 2 and Sunday 3 April. Note that Daylight Saving ends half way through the contest; NZ Local Time applies on both days of the contest.

VHF Convention

Wellington – Easter 2011

The Wellington VHF Group invites you to attend the VHF Convention to be held in Wellington during Easter, 22 – 24 April, 2011, at Tawa College in Tawa. Come and enjoy Lonely Planet's fourth top city in the world to visit in 2011 and see for yourself why Wellington is the "*coolest little capital in the world*."

On this occasion, the Convention is being held in conjunction with the annual Wellington Radio Expo–Wellington Expo-11. The official opening will be after lunch on Saturday 23 April to enable out-of-towners and locals to fossick through the treasures at the Expo that will be seeking new homes. (See the Expo notice elsewhere in this issue.)

VHF Convention offers a great programme for both the newcomer and the experienced Ham, and will include an exciting mix of speakers and events including technical presentations, VHF Forum, the "Wallace" mobile rally, ATV, Satellites, Special Interest Groups and a forum for Repeater and Beacon Trustees and National System Trustees.

The nearest motel is Aotea Lodge, near the Police College and there are 6+ other motels in Porirua; none more than 5-10 minutes drive and 3+ in Johnsonville, 4-5 minutes drive from Tawa.

The cost will be \$50 per person attending the Convention which includes afternoon tea on Saturday and morning tea/lunch/afternoon tea on Sunday. Arrangements are being made with a local restaurant for a 'pay as you go' dinner on Saturday night. Entry to the Wellington Expo-11 costs an additional \$4.00, to be paid at the door.

More details on the programme will be published via Infoline as soon as they are finalised. Registration forms are available on the Wellington VHF Group website <www.vhf.org.nz>.

Wellington VHF Group Inc. – Branch 74 NZART

<zl2wa@clear.net.nz>

Te Puke Amateur Radio Club Inc. Annual "Junk Sale" ~ Saturday 5 March 2011

Paengaroa Community Hall, Old Coach Road, Paengaroa.

Open 06.30am, Sale at 10.00am.

\$20.00 Per Table or \$12.00 For Half a Table

WARO get-together at 10.30am. Breakfast from 07.30am.

Further details and table bookings: Ph (07) 533 1029 or Email: syd.rowe@xtra.co.nz

Hibernation Contest: All bands 50 MHz and up. Saturday 11 and Sunday 12 June. This is the week-end after NZART Conference.

Brass Monkey Contest: All bands 50 MHz and up. Saturday 6 and Sunday 7 August.

Microwave Contest: All bands 614 MHz and up. Saturday 1 and Sunday 2 October.

Field Day Contest: All bands 50 MHz and up. Saturday 3 and Sunday 4 December.

For all contests, the operating periods are 1700 to 2300 on the Saturday, and 0700 to 1300 on the Sunday, NZ local time. The com-

plete Contest Rules are available at: <<http://www.vhf.org.nz/pubs/Contests/VHF-UHF-SHF-ContestRules>>

Summary

If you have input and pictures for the columns ahead; such as DX activity reports, repeater installation, branch activities, snippets of interest, technical items etc, please send to Stephen ZL1TPH email <zl1tph@xtra.co.nz> and Simon ZL1SWW <zl1sww@nzart.org.nz> or *Call-Book* addresses. (We also accept large picture files sent via email).

The Morseman

Gary Bold ZL1AN

<Morseman@nzart.org.nz>



Who defined the characters?

I was recently asked “Who defined the symbols for the Morse code characters? The more common characters generally have the shortest symbols assigned, but is this assignment optimum?”

Samuel Morse was primarily a painter, and quite a good one. He wasn't skilled in either mechanical construction or electrical principles, but he had the assistance of several co-workers who were. One of them was George Vail. George Oslin states in his authoritative book^[1]:

“In November and December 1837, when Vail built the instruments, he visited Louis Vogt, proprietor of a print shop in Morristown, and, over a case of type, learned which letters of the alphabet were used most frequently. He assigned the fewest dots and dashes to those letters”.

The “instruments” referred to are almost certainly the first Morse sounder and key. It is now generally agreed that all major ideas in the development of the first useable “Morse code” symbols are due to Vail, and that of the sounder was due to Joseph Henry, whose name is now immortalised in the unit for inductance.

In the summer 1987 edition of “Morsum Magnificat”, a wonderful journal unfortunately no longer published, Tony G4FAI showed a photograph of a page of Samuel Morse's later notes, a three-column, hand-written table. The first column shows the letters of the alphabet. The second shows the quantities of the metal letters in the case of type. The idea was that the relative number of each letter available would approximately reflect the relative frequency of each in English text. And in the main, the more common letters do have the shorter symbols assigned, though there are unexplained discrepancies.

Thus, the symbols were assigned using a crude form of probability theory, which is now applied in a more sophisticated manner to produce, for example, Huffman codes. This original code was

modified several times, and has few resemblances to the modern one. Morse and Vail used a dot, a dash, a “long dash”, and an “even longer dash”, as well as internal spaces inside characters! Nevertheless, a later version of this, “American Morse”, was used on all US telegraph landlines throughout its history, until about 1950. You can hear samples on the web^[3]. The first (listen to “set 1, part of side 15”) is recorded from a telegraph sounder, the second, estimated to be made around 1910, comes from a wax cylinder and appears to be a home-made recording of a radio check from a spark transmitter. The page includes its most probable translation. Listening to it, you'll conclude that this is certainly not Morse as we know it!

Is this assignment optimum?

By optimum, we mean “what symbols assigned to letters would result in “average English” text being transmitted in the shortest time? And would there have been a better assignment?”

Calvert gives further details in an excellent downloadable document^[2]. When Europe adopted Morse code, the Austrian Telegraph chief, Steinheil, and one of his engineers, Frederick Gerke, were unimpressed with the American code's eccentricities, and around 1849 Gerke composed a revised one, eliminating all internal spaces, and all symbols except the “dot” and “dash”. This, the “Continental” code, is basically the “International” one that we use today.

Again, the Austrians assigned the shortest symbols to the most common letters. We can see how well they did it from Figure 1. The black (left-most) bar-graph shows the probability in percent (vertical axis) plotted against letters, arranged in order of decreasing probability, in “typical English” text^[4]. The white bars show the corresponding lengths of each letter, counting each dot as 2, and each dash as 4 (to include the “dot-space” at the end of each character).

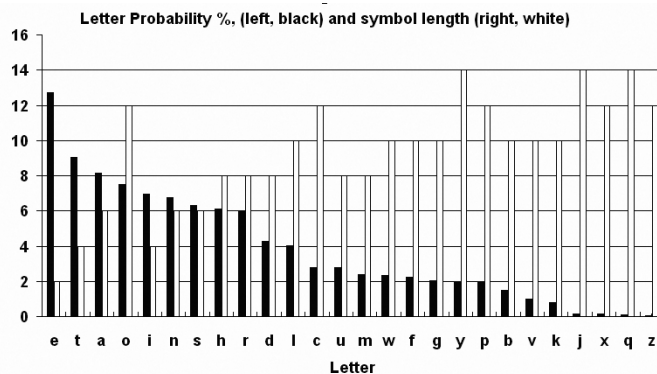


Figure 1: Black: Percentage probability of letters.
White: Lengths of code characters.

Ideally, the shortest symbols should be assigned to the most common characters, so the lengths of the white bars should increase from left to right.

In general, they do. The longest characters (highest white bars) are certainly on the right, but there is one obvious discrepancy at the left. The letter “O”, the fourth most common in English, (probability 7.5%) has a symbol which is too long for its place in the sequence. It would have been better to assign it a shorter symbol. But these assignments were made to fit the language of its compilers, German, and “O” is much less common in this language, ranking fifteenth in order of probability (2.5%). A plot similar to figure 1 using German probabilities shows a much better distribution! Thus, we're using a symbol coding which is optimised for another language!

If you sum the products of each letter's probability and length, you get a number which is proportional to the time taken for “typical” text transmission. If we were to swap the codes for “O” and “U”, we'd get a transmission speed 2.5% faster. Not much. And if you completely

re-order all the symbol lengths to increase monotonically from left to right in the plot, the transmission speed would still increase by only 5.8%. Again, not much, and of course, nobody contemplates doing this, as it would change the code dramatically and we would all have to re-learn it. Also, it would then be optimised only for English, and users of other languages would take a dim view.

Anyway, the six most common letters account for about 51% of all text, in English. In German, 55%. It turns out that if you get the assignments of these letters right, the rest don't matter too much. American Morse, because of its higher proportion of dots in symbols, is estimated to have been about 20% faster than the modern code, when sent by an expert operator, but because of its internal spaces required accurate sending to avoid confusion.

A useful code-practice oscillator

I hope that some of you have been inspired by the efforts of Phillip N8AYE, described in my last column, to motivate your children or

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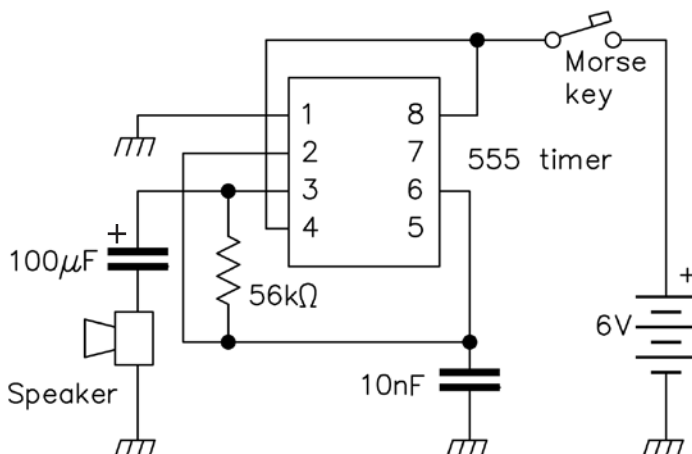


Figure 2: A simple code-practice oscillator.

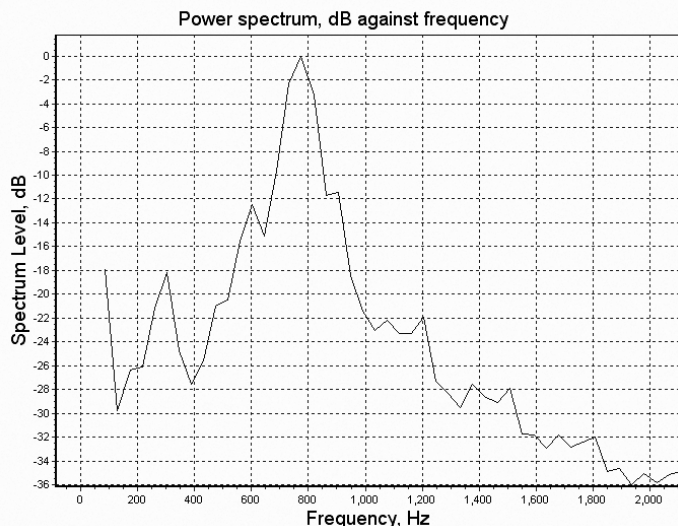


Figure 3: Response of band-pass filter.

■ continued from page 23

grand-children to learn Morse. You may be surprised, as I have been several times over the last 40 years, to find how readily very young minds can pick this up. Passing “secret messages” is something that usually grabs them. You’ll require a suitable audio oscillator.

Figure 2 shows the one I published in the July-August 2008 column, the simplest circuit I know. You can whip it up on a breadboard in 30 minutes, and it also makes a nice “introduction to soldering project” for older children. To guard against chip-overheating by younger hands wielding a hot iron for the first time, use a socket and insert the chip last. Four torch cells soldered in series will power it for ages, drawing about 65 mA key-down, and producing a loud, rasping tone audible even in child-intensive environments. The NE555P timer chip is commonly available all over the place, mine cost \$1.34 at DSE®. Any speaker will do, mine was salvaged from a dead transistor radio.

The frequency is set by the 100kΩ resistor-capacitor combination. As shown, the frequency will be about 700–800 Hz. Increasing the value of either this resistor or the capacitor will lower the frequency. You might also like to model this circuit using *LTspice*, a freeware modeling package I have recommended several times, and which contains a macro-model for the 555 timer chip. Just Google on “*LTspice*” to find it. This is very informative, and if you really want to understand how this chip works,

study the waveforms produced at pins 3 and 7 in conjunction with the spec sheet—also easily found on the web.

This raises another question I get asked several times a year: “Where can I buy a Morse key in New Zealand?” As far as I know, you can’t. Until about 1977 Tricity House®, in Christchurch, sold the “Supreme” hand key, and at that time they cost \$11.66. These were made by Eric Sorenson, and I wrote about them in the November/December 2007 column. If anybody else knows of a local source, I’d be delighted to hear about it! It seems to me that if somebody with a home engineering workshop started producing a simple key, there would be a small but regular market for it.

A wonderful variety of hand keys are advertised from overseas sources on the web, but they are very expensive. But there are probably dozens of them, no longer in use, in junk-boxes of older Hams all over the country. How about donating them to the local NZART Branch for learners to practice with?

The “Single Capacitor” band-pass filter

In the last column I described the solution to the preceding month’s problem, the transfer function of the single-capacitor audio filter shown in figure 4(a). The unique feature of this circuit is that when simulated in *LTspice*, it implements a band-pass characteristic, but doesn’t seem to have enough capacitors (you need two) to do this. Nor does such a transfer char-

acteristic arise when you analyse it using the standard “infinite gain” approach. Only when you insert the finite-gain, low-pass roll-off characteristic of a “real” op-amp does the frequency-selective transfer function result. It uses the feedback capacitor inside the op-amp as the second one. Our senior technician found this circuit on the web, but when we went back to check, it had vanished. We have never seen it since. My derivation of its operation is on my web-page^[5]. Well, actually it turns out to have a low-pass characteristic, but if the Q is high enough, its operation is essentially the same.

I wondered how well this would actually work as an audio CW filter, so I tried it. Indeed, it works, but is really too sharp to be useful. All I did was to feed the receiver’s output audio to the input of the operational amplifier circuit, and connect a PC amplified speaker unit to its output. My multimeter told me that the speaker unit had an input resistance of about 2.7kΩ, so it didn’t load the output too much. The resonant frequency dropped slightly to 762 Hz, with

3 dB frequencies of 755 and 767 Hz, giving a nominal Q of about 63. This is pretty narrow, and since the filter implements only two poles; like a single tuned circuit, it’s not as pleasant to use as a properly designed, multi-pole filter having a flat and somewhat wider pass-band.

Figure 3 shows my attempt to capture the output spectrum using Paul Kellett’s *Analyzer* and my program *PlotSpec*, which are described, with download instructions, on the “software” section of my web-page. This technique uses, as input, white noise from the receiver tuned to a signal-free frequency. The resolution is poor, since *Analyzer* on its highest-resolution setting only captures frequencies 43 Hz apart. Nevertheless, you can see the general trend, although the plot, particularly in the skirts, is contaminated with multiples of 100 Hz hum which crept in somewhere. Unfortunately *Analyzer*, written in 1997, runs in the 32-bit version of Windows 7, but not in the 64-bit version, and Paul tells me that he has no plans to re-compile it so that it will. One day, when I understand

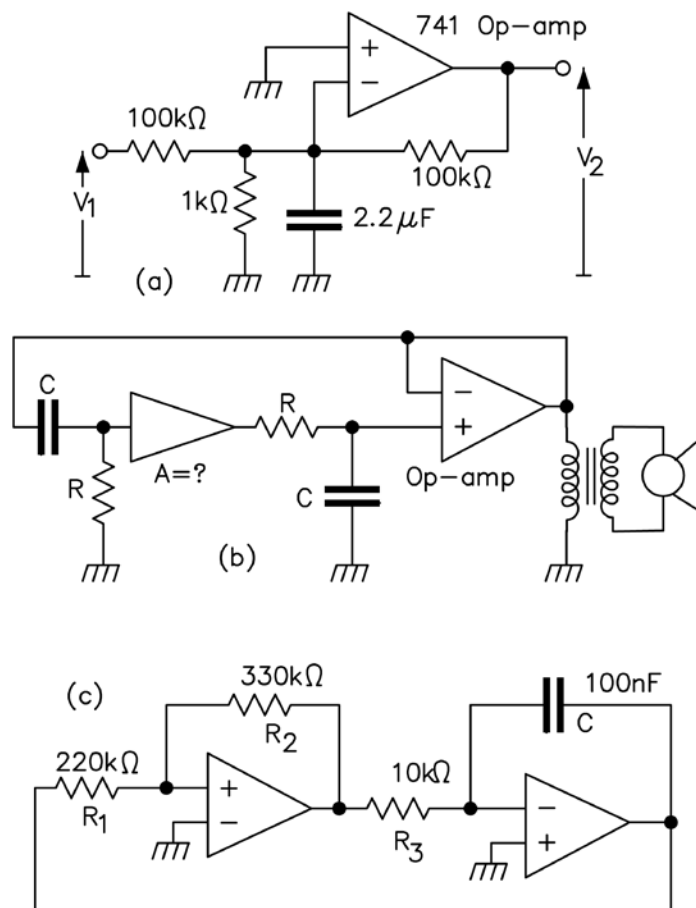


Figure 4: (a) Band-pass filter. (b) Last month’s problem. (c) This month’s problem.

TOPO50 Map series – useful URLs

The MED has been using the TOPO50 map series, for radio licensing purposes, for more than six months. Several members have asked for more information on this map series. The most informative websites, including additional links, are: <<http://www.linz.govt.nz/topography/topo-maps/topo50/index.aspx>> and <<http://www.linz.govt.nz/topo50/sheets/index.aspx>>

Proposals

None this month.

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Delphi sound-card routines better, I'll attempt to replicate it, since it's a really useful program.

The filter's resonant frequency increases slightly with supply voltage, for the reasons outlined in my solution, and also varies with different 741 chips, the only op-amp we've tried in the circuit. If you have a spare 741 floating around, and a 2.2 μF tantalum capacitor (not an electrolytic, too much leakage), try it and tell me what you think. You can reduce the Q by decreasing the value of the 1 k Ω resistor, but I didn't try this.

Last month's problem

See figure 4(b). What is the unknown gain, A , for oscillation? What will be the oscillation frequency? Even though there are two active stages and two RC networks, the loop gain must still equal unity. The second stage is a voltage follower, having unity gain, so all gain must be supplied by the first stage. Find the product of the transfer functions of the two RC networks and the unknown gain A , and then the angular frequency where this is a positive real number. This occurs when $\omega = 1/RC$. The reciprocal of the resulting transfer function is the value of A required, and this is found to be 2. The only solution was submitted by Ron ZL1AI, correct as usual. Ron also submitted an LTspice simulation verification. As with all computer oscillator

Final recommendations to NZART Council

Branch 39 Tauranga has applied to link to Shaw Road 7175 and 855, from Minden 680, located at Topo50 map reference BD36 691.76 217.82. The link transmit frequency will be 433.550 MHz and the link receive frequency will be 438.550 MHz. An Engineering Evaluation shows that there will be no interference to other stations.

Branch 46 Wairarapa has applied to change the frequency of its National System UHF Link Station at Pariwhariki Trig, Topo50 map reference BP35 288.84 459.75.

simulations, you usually have to set the loop gain slightly higher than the theory predicts to get it to start. Practical circuits contain non-linear elements to eliminate this problem, which for low oscillation amplitudes set the loop gain slightly high, then progressively reduce it as the amplitude increases. See the May-June 2007 column for an example circuit of a positive-gain amplifier which achieves this. See my web-page for an expanded solution^[5].

This month's problem

See figure 4(c). What does this circuit do? What waveforms will be observed at each of the op-amp outputs? Can you find an analytic expression describing the frequency of these waveforms?

References

- [1] George P. Oslin "The Story of Telecommunications", Mercer University Press, 1992.
- [2] J.B. Calvert, "The Electromagnetic Telegraph" at <<http://mysite.du.edu/~jcalvert/tel/telhom.htm>>
- [3] For the sound of American Morse, see <<http://www.normanfield.com/Morse.htm>>, <<http://tinfoil.com/cm-0406.htm>>
- [4] For language letter frequencies, see <http://en.wikipedia.org/wiki/Letter_frequency>
- [5] My web-page is at <<http://www.qsl.net/zl1an/index.html>>

The new transmit frequency will be 434.975 MHz and the receive frequency will be 439.975 MHz. An Engineering Evaluation shows that there will be no interference to other stations.

Branch 53 Te Puke has applied to increase the power of its 7175 repeater located at Shaw Road, Topo50 map reference BE37 870.20 014.96. An Engineering Evaluation shows that the repeater transmit frequency can remain on 147.175 MHz and the repeater receive frequency on 147.775 MHz, and that there will be no interference to other stations.

Branch 53 Te Puke has applied to increase the power of its 855 repeater located at Shaw Road, Topo50 map reference BE37 870.20 014.96. An Engineering Evaluation shows that the repeater transmit frequency can remain on 438.550 MHz and the repeater receive frequency on 433.550 MHz, and that there will be no interference to other stations.

Branch 53 Te Puke has applied to up-link to Takaurunga 540 from its BBS at Totara Street, Topo50 map reference BD37 809.83 218.01. The link transmit frequency will be 144.800 MHz and the link receive frequency will be 145.400 MHz. An Engineering Evaluation shows that there will be no interference to other stations.

Branch 74 Wellington VHF Group has applied for a Spectrum Licence on TV Channel 39 for its Belmont ATV repeater, to replace its previous Radio Licence, cancelled by the MED as part of the

Digital Switch-Over process. The location is Belmont, Topo50 map reference BQ32 568.79 398.86. All of the engineering parameters are unchanged from those of the cancelled licence.

The Radio Electronics Group has applied to move its 2 m repeater to Peacockes Road, Topo50 map reference BD33 030.88 129.32. We have selected a repeater transmit frequency of 147.125 MHz and a repeater receive frequency of 147.725 MHz. An Engineering Evaluation shows that there will be no interference to other stations.

The Radio Electronics Group has applied to move its 70 cm repeater to Peacockes Road, Topo50 map reference BD33 030.88 129.32. We have selected a repeater transmit frequency of 438.875 MHz and a repeater receive frequency of 433.875 MHz. An Engineering Evaluation shows that there will be no interference to other stations.

Comments and applications

Please send your comments and suggestions on the above matters, and on any other FMTAG matters, by e-mail to: <fmtag@nzart.org.nz>.

Applications for repeaters, beacons, digipeaters, point-to-point links, and so on, should be made on the latest version of FMTAG Form 10. The latest versions of FMTAG Form 10, and the explanatory Form 10A, are available on the NZART website: <<http://www.nzart.org.nz/fmtag/index.html>>.

Completed forms should be sent by e-mail to <fmtag@nzart.org.nz>.



NZART Radio Science Education Trust Application for Grant-in-Aid

Applications are invited from secondary school science teachers and other training providers for Grants-in-Aid from the NZART Radioscience Education Trust to promote the development of projects in the general areas of radio and/or electronics. It is anticipated that these projects will lead to entries in the local area Science and Technology Fair. Grants will not normally exceed \$250.00

Applications should normally be received no later than 30th April of the year of application. Application forms may be obtained from:

The Trustees, NZART Radioscience Education Trust, PO Box 1733, Christchurch 8140 or from <trustee@nzart.org.nz>. Applications should be endorsed by the Head of Science or, for other organisations, the President/Chairperson.

Digital Modes

Murray Greenman ZL1BPU
<zl1bpu@nzart.org.nz>



In this issue I'll discuss some options for Software Defined Radio (SDR), review a rather nice SDR receiver, and introduce the hidden world of QR codes.

Software Defined Radio

When the idea of a completely software defined radio first emerged, few amateurs took the idea seriously. After all, who wants to listen to the ham bands with a computer; reception full of computer noises, second rate performance, no portability, with no decent knobs to twiddle? That was certainly true of some of the early attempts, but we now need to take SDR seriously.

Perhaps the easiest way to get your 'feet wet' in the world of SDR is to buy or build a simple 'SoftRock'® SDR receiver^[1] (there are also transceiver versions). These little units are USB powered, fixed frequency units which put out I&Q (In Phase and Quadrature Phase) audio as a stereo input to the computer sound card. While not the only simple SDR kit available, the SoftRock by Tony Parks KB9YIG has been much the most popular.

The SoftRock, in its simplest form, consists of a fixed-frequency local oscillator, a divider to provide quadrature clocking, and a dual mixer directly converting to audio, typically a Quadrature Synchronous Detector (QSD) using a high-performance multiplexer chip. The output of this device is I&Q audio fed to the computer sound card. Signal tuning within the available bandwidth is achieved in the software. Kits are currently available for many bands, and in three versions. The simplest kit is a mere US\$20, so you can see why it is popular!

The SoftRock can also be used as an IF receiver, for example on 455 kHz, so you can use the computer software as a panoramic adaptor as well as detector and audio output for a conventional receiver. Adding one of these to an existing receiver with few options for filters and detectors can revolutionise

its performance, and you still get to tune around with the receiver itself, as all the IF SDR replaces is the detector and audio.

There are many other kits and built-up units, some much more sophisticated, single band receivers, transceivers and general coverage units. Most of these are outside the price range of the SDR beginner, but if you are really keen, check out the HPSDR project promoted by TAPR^[2], and the Software Radio Laboratory QS1R^[3]. This last unit will set you back US\$1000 or so.

Adding DDS, A-D and an FPGA

SDR units have become very sophisticated. The simple units allow you to tune only within the range of a fixed local oscillator plus or minus the 'IF' frequency provided by the sound card. If you use the highest 192 kHz sampling rate, it means you can tune 96 kHz either side of the oscillator. The next step up is to add a variable local oscillator (which may be a Direct Digitally Synthesised or Fractional N type), typically computer controlled, so you can tune anywhere, but the bandwidth you can see at any one time is still limited. The Australian Genesis G59^[4] is an example of this type.

The more sophisticated receivers add a highly complex (and very fast) analog to digital converter and digital processor which down-samples the receiver IF to the bandwidth required by the receiver. This type typically uses USB as the output, thus avoiding the bottle-neck and performance limitations of the conventional sound card.

The QS1R mentioned above is an example of this DDS+FPGA type, as are the excellent Perseus^[5], the FlexRadio FLEX-1500 and family^[6] and the RF Space SDR-IQ, which I will describe in more detail.

As the performance of these units has improved, so also has the quality and utility of the accompanying software. A certain standardisation of interface has evolved, and now it is possible to run several different computer

programs with several different SDR units, and so compare the performance of each. I've not been able to compare different receivers, but will make some comments about different software options I've tried.

We are now at the point where, in deciding what new radio you should buy, you should seriously consider the SDR approach as an option, especially if considering it as a second receiver. The performance can be VERY good. SDR has several advantages:

- Flexibility – multiple modes, very wide bandwidth, very wide frequency range.
- Agility – scanning, frequency hopping and chirp sounding become possible.
- Future-proof – software and firmware is upgradable to provide new options.
- Excellent user features, such as sophisticated filters, notches, noise blankers.
- High stability, calibrated gain and frequency accuracy are readily obtained.
- As a second receiver, it can be used to track a CAT-equipped receiver.

At present there are a couple of minor disadvantages, from the point of view of the conventional receiver user:

- No knob to turn or buttons to push (although there are add-on USB 'tuning knobs').
 - A little more complex to use – many more options available, and confusing setup.
 - Software not always intuitive, and a fast PC is usually required.
- However, there are no longer any

serious limitations to performance; the best SDR receivers have intermodulation and filter performance to die for, amazing stability, excellent tuning aids (such as panoramic displays), low distortion detectors, excellent sensitivity and low noise performance. They are especially good for weak-signal work where a clean IF with low spurious levels is important. I find the SDR especially good for VLF and LF reception, where signals are very weak, the man-made interference is immense, and broadcast station intermodulation is a serious problem even with the best conventional receivers.

The RFSpace SDR-IQ

Many ZLs are better equipped than me to advise on SDR, but thanks to the generosity and patience of Chris ZL1BOE, I have been able to explore this little unit in some depth. The SDR-IQ^[7] was designed by long-time digital expert Moe Wheatley AE4JY^[8] (some will remember his ionospheric simulator and widely used PSK31 DLL). There are newer models, such as the very clever SDR-IP (which has internet output, so can be accessed remotely!), but I'll stick to describing the US\$525 SDR-IQ, which has USB interface and is USB powered.

What you get for your money is a box you can hold in the palm of your hand (smaller than a packet radio TNC), with a BNC RF connector and a USB connector on the back, and several LEDs on the front. With digital down-sampling, the receiver can deliver a bandwidth of 196 kHz anywhere from 500

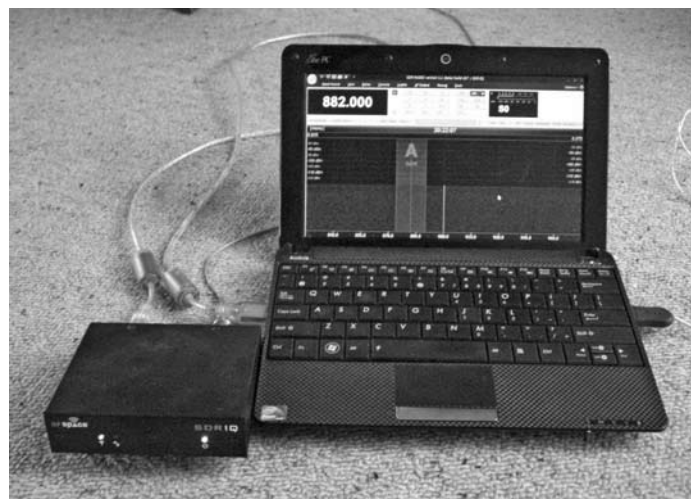


Figure 1. The SDR-IQ operating with a Netbook.

Hz (yes, Hz!) to 30 MHz, with a resolution bandwidth down to under 1 Hz. It uses a 14-bit A-D converter sampling at 66.6 MHz, and since the output is digital via the USB interface, all the spectral management and demodulation is done at the computer, and thus can be updated and adapted by simply changing the software.

In the SDR-IQ there are also computer controlled attenuators and preamp, and a 1Hz step synthesised and computer controlled local oscillator. The receiving software provides AM, USB/LSB, WBFM, NBFM, DSB and CW reception. The filters used in each mode are fully adjustable and can be remembered when you change modes. Depending on the software you use, there can be multiple adjustable notch filters, tracking notch filters, excellent adjustable noise blankers and a range of AGC options.

I've used the SDR-IQ mostly with my home-brew PA0RDT Mini-Whip^[9] active antenna; it's a good match, since the active antenna also has a wide frequency response from a few kHz to 10 MHz or more. On LF, receiving real DX transmissions down as far as 12kHz is relatively easy, and the time and frequency stations on 40 to 60 kHz are very good copy. I've been able to identify more Non-Directional Beacon (NDB) MF stations than ever before (from all around the Pacific), and reception on the new 505 – 515 kHz Amateur band is very good, despite the proximity of strong broadcast stations as close as 531kHz.

The SDR-IQ unit itself performs very well, and there are no receiver noises that I can attribute to the unit, or even to the computer with which it operates. It does however need a fairly fast computer, especially with the more sophisticated software. I've used the unit with large conventional antennas as well as the Mini-Whip, and it has performed flawlessly. The only time you are likely to hear unwanted noises from the computer is if you try to operate it with a short piece of wire poked into the antenna socket – then you'll hear more computer noise than signals!

Although more a criticism of

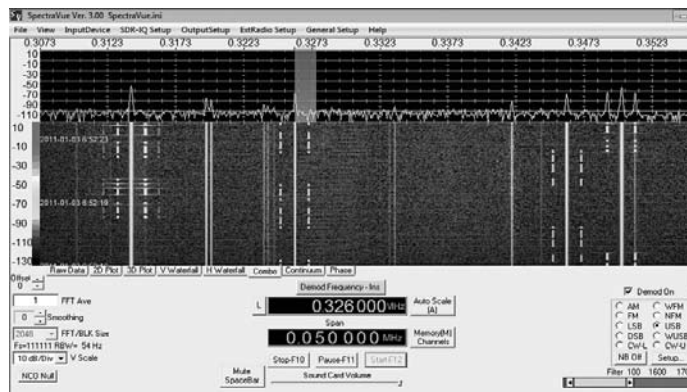


Figure 2. SpectraVue receiving NDBs.

some software rather than the SDR-IQ, I've not found the unit especially easy to tune. I find it best to tune the receiver to the approximate frequency, and then click on the screen to select the signals. Correctly demodulating the actual signals is very easy, and it's really useful to be able to see adjacent signals on the display. The audio is excellent, clarity is better than most conventional receivers, and the adjustable filters very effective and easy to use. I was especially impressed with AM broadcast reception using synchronous detection. This same detector also does a great job with NDBs; I can receive all North Island and some South Island NDBs during the daytime!

I&Q Software

The SDR-IQ comes with a CDROM containing the USB driver and receiver software. Installation is straightforward, although I found that on one Win XP™ computer it persisted in recognising the device as a serial port, not allowing the driver to be loaded. I finally sussed the problem by letting it do this and then 'updating' the driver for the resulting 'serial port' to the

driver provided on disc. There were no problems with Windows 7™. The screen shots shown below were captured on an ASUS EEEPC (1.6GHz Atom processor) running Windows 7.

The software which comes with the SDR-IQ is called SpectraVue. The latest version, along with any SDR-IQ firmware updates, are available on the website. I found SpectraVue to be functional, but it is quite old-fashioned looking, and is nowhere near as easy to operate as some of the newer third-party software. I found tuning quite confusing, and I recommend you move on to some of the other available software once you have the hardware working.

One of the most sophisticated programs I tried was WRPlus, based on the well-known program Winrad by Alberto di Bene I2PHD. The beta release seemed to be fully functional as far as I could tell, and although there's no help information, setup and operation are both easy enough. I'm listening to broadcast radio using this software as I type, on the same computer. The AM audio quality, especially using the ECSS (synchronous) detector, is really

great, although some stations are better than others, mostly due to use of excessive compression. On a 2.2GHz Celeron computer there's only just enough computer power. You also need a fairly big screen (it won't run on a Netbook for this reason), and it has to run full screen, although there is room for other programs alongside. The display is rather stark with a black background, but everything is there and works well.

The technical performance of WRPlus is excellent. Going by examples on the website^[10] WRPlus has better anti-alias filters than other software options. The software is (relatively) easy to use, and clearly shows the LO and carrier frequencies at the top of the screen. If you tune in an AM signal (such as WWV), using the ECSS detector, it locks to the carrier and gives you a readout of the carrier frequency to 1Hz resolution. When I tune to WWV on 10 MHz it shows an error of 27 Hz (which can be calibrated out). Many SDR receivers (but not the SDR-IQ) have the ability to lock to an external reference.

The other software I've tried is SDR-Radio^[11], also a beta version. This particularly nice-looking software runs very well on my little Asus EEEPC Netbook. It has quick-select buttons for the main ham bands and the usual selection of modes, with remembered bandwidth settings. This highly portable arrangement (since the SDR-IQ is powered by the Netbook) is great for use in the field or on holiday.

Although it works very well, and is my preferred program since it is easy to use, I found tuning on SDR-Radio a little unusual, as you can't directly (as far as I can tell) tune the carrier frequency. You select the LO frequency and then click on the signal you want, or drag to it. I guess this makes sense when you consider the hardware involved. There seems to be no way to tune up and down except by dialling the LO frequency, and when you run off the screen the spectral display then jumps to centre the current LO frequency. You can't drag the spectral display.

SDR-Radio is written for

continued on page 28

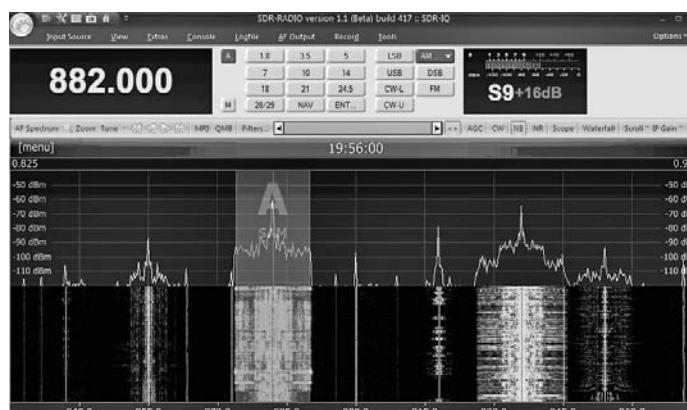


Figure 3. SDR-Radio screen showing AM reception.

■ continued from page 27

RFspace, apparently by Simon Brown HB9DRV; well known as the developer of all-singing, all-dancing Ham Radio Deluxe. Look out for more developments from this source, as I gather the full version of SDR-Radio will include direct hooks to the digital-mode part of Ham Radio Deluxe (DM780).

There are several further general-purpose SDR programs which I've not had an opportunity to try with the SDR-IQ. These include Power SDR (Flex Radio), SDRadio (I2PHD) and GNU Radio.

QR Codes

The other topic of interest this month is the little QR code^[12]. Is this some alternative to Morse, you ask? No, indeed, but interesting none-the-less. No doubt you've seen the supermarket bar codes that are printed on everything from Apples to Zinnias these days. Well, the QR code is like a two-dimensional bar code, and is convenient because it can carry free-form text and packs a lot of information in a small space. It is especially useful for labelling small parts, such as high-value electronics, where a bar code would not fit.

QR codes come in many sizes, depending on the level of embedded error correction (RS coding is used), the resolution of the image (bigger ones are easier to read) and the size and format of the message enclosed. These days cameras (and especially camera-equipped 3G phones) include QR reading technology. Advertisers also make use of these codes so that mobile users can be tempted to visit their stores or web sites. QR codes containing URLs are becoming common on web sites these days.

Although I've seen them on electronic products, I first ran across



Figure 4. QR code example.
What does it say?

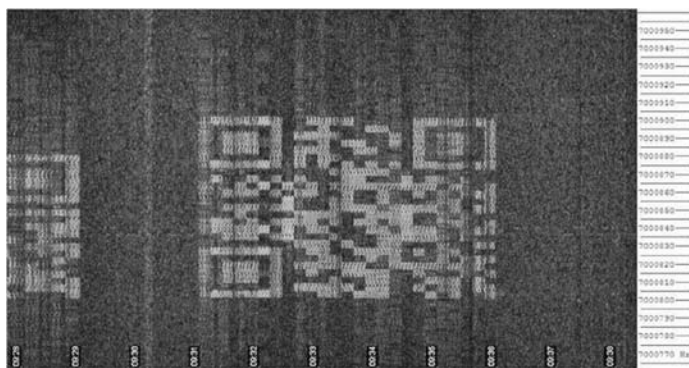


Figure 5. 40m example of a QR code.

QR codes in relation to Amateur radio when a QRSS Knights member discovered one on HF (see Figure 5). This one was sent on 40 m, as a signal only 100 Hz wide, using DF6NM's Chirppix technology, as a concurrent multi-tone Hellschreiber image. It was immediately recognised as a QR code, but it was several days before anyone managed to crack what the message was, because fading and blurring made it difficult to decode. The first to achieve the decode was Scott AJ4VD, who cleaned it up by painstakingly transferring the information (over 40 000 pixels) to a new grid, to reveal that the message was 'WELL DONE / F4GKA QSL PSE 73'. You can read how Scott went about it in his November blog^[13].

Because of the embedded error correction (the conventional bar code only has a simple error detection capability), the QR code can be decoded even when part of the label is missing or is defaced.

However, code designers Denso-Wave (subsidiary of Toyota) never planned for the codes to be sent as radio images!

There are a couple of useful sites on the web which will encode and decode QR codes for you. For encoding, see <<http://zxing.appspot.com/generator/>>, and for decoding, see <<http://zxing.org/w/decode.jspx>>. See if you can decode the image in Figure 4!

QRP Digital modes on 600m

Graham Ockleston ZL1QM recently put together a new all-CMOS low powered 600m transmitter for me. The power amplifier operates in push-pull Class D, and the output is about 10W (given antenna efficiency of under 1%, that's definitely QRP!) I first used the transmitter with my Rubidium Synthesiser and PC script program, which allowed me to transmit the frequency shifted message seen in Figure 6, which repeated every five minutes.

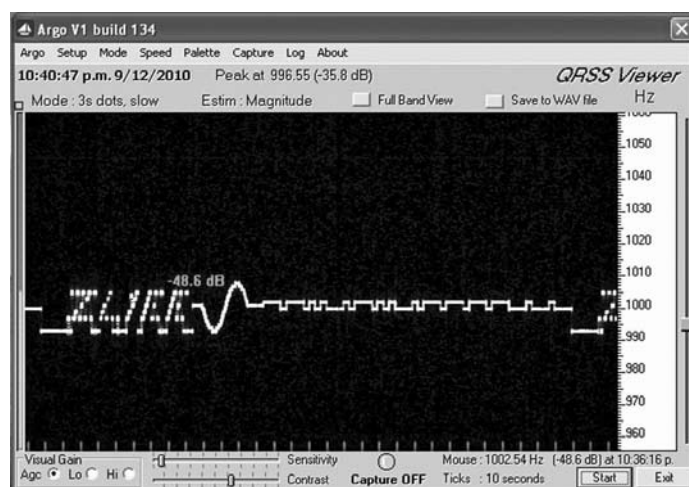


Figure 6. QRP signal on 600m using new transmitter.

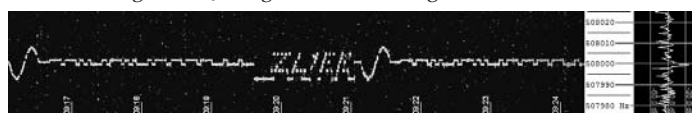


Figure 7. QRP signal received by VK2DDI.

If you look closely at the message, you'll see that there was no time when the carrier was actually off. The reason for this is that the driver stage of the transmitter is unstable without drive, so I could not simply control the transmitter by keying the synthesiser. This signal was nicely received by several stations in VK, as is clearly confirmed by the following mid-December screenshot from David VK2DDI, where reception is best over the two hours following local sunset.

I've since added PTT control to the transmitter and adapted the ZL1BPU LF Exciter to operate at 600m, so it and the little transmitter can operate without the computer. I plan to embed an upgraded Exciter in the transmitter. Recently I've also been operating it using WSPR software and my SSB Exciter, and again it has been received well in VK. The technical details of the new transmitter, Exciter and various modifications will be published soon, I hope.

References

- [1] See <kb9yig.com/>
- [2] See <www.tapr.org/>
- [3] <www.srl-llc.com/>
- [4] <www.genesisradio.com.au/>
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- [7] <www.rfspace.com/RFSPACE/SDR-IQ.html>
- [8] <www.moetronix.com/ae4jy/>
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- [10] <www.wrplus.altervista.org/>
- [11] <sdr-radio.com/>
- [12] <en.wikipedia.org/wiki/QR_Code>
- [13] <www.swharden.com/blog/2010/11/>

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My stock of articles etc for future issues is running low so I appeal to members to assist with material for publication. This could be short or long articles on any topic related to amateur radio and electronics, constructional articles, book reviews, equipment reviews, software reviews, branch activity reports, etc. I should also like to receive articles on electronics related topics such as auto-electronics, home sound systems, workshop practice; in fact anything that hams might find of interest. Thanks and 73.

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Andrew Barron ZL3DW
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Isn't it annoying when you have a strong signal which suddenly fades away during the satellite pass? The problem is often polarisation mismatch between the satellite and your receive antenna. As the satellite passes over, the relative polarisation of the signal changes continuously. The answer is to use cross polarised or circular polarised antennas. I wonder how many satellite operators in New Zealand are using cross polarised antennas? I don't, but I have had a project in mind for a few years now! Please send me the details of your satellite setup. I am sure others would like to read about it. I am also interested to know if anyone is using one of the hand held "Arrow" type antennas, they are very popular overseas. Do you operate satellites using a portable setup?

The G6LVB 'FUNcube Dongle' 64MHz to 1700MHz SDR receiver developed by Howard Long G6LVB finally went on sale and sold out in less than a minute, but there will be more. Check the website at <<http://www.funcubedongle.com/>> and video at <http://www.youtube.com/watch?v=RqzTBPLqal0>.

The AO-51 Control Team has instigated power management as the satellite is now operating with frequent eclipses which reduce the solar charging efficiency. This means that the transmit power of the satellite may be reduced or the satellite may cease to transmit when not in sunlight. The satellite



will return to normal service late February.

Fastrac 1 and 2 were built by students from the University of Texas and launched from Kodiak, Alaska. They are a pair of 23kg student-built nano-satellites satellites also known as "Sara Lily" and "Emma". The scientific mission is to investigate relative navigation, attitude determination with GPS, and a micro-discharge plasma thruster. Amateurs are encouraged to submit telemetry from either or both satellites via the project website. After the primary science mission is completed, both satellites may be opened for general amateur radio use as UV mode 1200 and 9600 baud digipeaters. Fastrac has been transmitting beacon and crosslink data which have been received by amateur radio operators around the world.

Hope Oscar HO-68 has just achieved one year in orbit. The communication payload includes a CW beacon and transponders for SSB/CW, FM and digital AX.25 packet operation. The linear transponder, used for SSB and CW working, has a bandwidth of 50 kHz which allows about 10-15 simultaneous contacts to take place. Due to Doppler shift the CW beacon can appear to be up to +/- 9 kHz from its nominal frequency of 435.790 MHz and you need to tune your receiver to follow it during the pass. The beacon has been received on simple antennas such as a 1/4 wave ground plane but for best results try a small Yagi with about 8 elements. Check the operating schedule on the Southgate website because the satellite is turned off when not over land to save power. See the video at; <http://www.youtube.com/watch?v=o6oDgUTHCwg&feature=player_embedded>.

REMEMBER:

Leave a three second pause between overs when using repeaters. Someone else may have an urgent message.

CDs: Nowadays many contributors are sending me graphics and photos, etc on CD and this is much appreciated.

At present the cost of a CD is less than the postage costs so, unless requested otherwise, they will not be returned. Please let me know asap if I still have a CD or photo that you would like returned and I will action.

Thanks, John ZL3IB Editor

NZART Conference 2011 Upper Hutt



Conference Update

We are now only a few months away from Conference 2011, so its time to start thinking about your attendance at this years Conference in Upper Hutt.

For cheap airfares, consider booking early or watch Air New Zealand's (Grabaseat) website for bargains. (<<http://www.airnewzealand.co.nz>>)

For travel from Wellington Airport, the Airport Flyer Bus is the best option, ask the drivers to stop directly opposite the conference venue just north of Stokes Valley. (Cost per adult is \$13.50 each way as of 1 October 2010).

For on-site accommodation only inquires or for general conference information, please use the contact points below (every effort will be made to reply to emails within one working day following receipt); do not contact the conference venue.

For more conference updates checkout March/April 2011 issue of *Break-In* for the registration information. Headquarters InfoLine will also have updates from time to time as information is updated or released.

Postal: UH Conference, 204 Plateau Road, Upper Hutt 5018

Email: uh.conference2011@gmail.com

[com/watch?v=o6oDgUTHCwg&feature=player_embedded](http://www.youtube.com/watch?v=o6oDgUTHCwg&feature=player_embedded).

On 21 December, ARISS celebrated its tenth anniversary of the first school contact. The first contact was made with Burbank School in Illinois on 21 December, 2000. Since that time, ARISS has performed 565 successful contacts with school children around the world including New Zealand.

Even the professionals sometimes have problems. UniverseToday.com reported that the geostationary satellite that became a "zombie" earlier this year and stopped communicating with ground controllers has now finally been reset and is under control. The Galaxy 15 communications satellite had its "brains fried" by a solar flare and went rogue in early May. Although it was still functional, its navigation and communications systems would not accept commands, and the satellite drifted out of its orbit. On 23 December, 2010, engineers at Intelsat were finally able to command the unit to reset after a battery drained. Shortly thereafter Galaxy 15 began accepting commands, and then was put into safe mode.

While there was little chance that Galaxy 15 would crash into another satellite, it caused some problems when it entered an orbital space occupied by other satellites and "stole" their signal, thereby interrupting other vendor's services to customers on Earth.

AO-07 is still providing excellent service check out this video; <<http://www.youtube.com/watch?v=vc09uUsRiPM&feature=related>>.

LoTW VUCC Award Support Testing — VUCC support is being installed and tested on Logbook Of The World. When this upgrade is implemented, amateurs can use LoTW to apply for awards based on Maidenhead grid squares, such as VUCC and the Fred Fish Memorial Award.

References

Southgate ARC website, AMSAT, LoTW websites. Please send me any news, feedback, requests, questions, hints, ideas, construction projects, interesting new purchases or whatever. I always need updates on the LOCAL activity, <zl3dw@nzart.org.nz>.

73,

Andrew ZL3DW

DX Downunder

Graeme Hunt ZL1ANH and ZL1T
<graeme.h@xtra.co.nz>



Firstly, condolences to Barry ZL2RR on the sudden loss of his wife recently. Barry is the ZL QSL Manager; a job he has carried out for our benefit for many years.

You have explained our DX hobby to friends, and had them produce a cell phone and tell you they can talk anywhere in the world for very little and text for less; a familiar occurrence? Last time that happened, I asked why he bothered with art, just take a photo, buy your fish from the supermarket, don't travel – rent a DVD about the country, and why garden? DXing is like a lot of hobbies, and a bit like cricket or American football, to do is to understand.

This is my third column and the difficulty facing me is just what technical level I should set and what DX is needed by the readers. We have beginners; thank goodness for our hobby's sake, and those with many years experience and all the awards, so please bear with me if my copy is old hat.

This month I'll look at what transceiver is best for DX. Many of us can remember when we used a receiver and a transmitter but today it's a transceiver or nothing. Basically the question is wrong, the correct question is what do I want my new transceiver to do, and here are some of things you may want:

- Power output; why buy a QRP (low power) rig when a 100W radio costs about the same and you can turn the power down;
- CW, SSB, AM, FM and DIGITAL, both RX (receive) and TX (transmit)
- Frequencies; TX bands from 1.8 MHz to 30 MHz, – plus 50 MHz 144 MHz and 430 MHz and general coverage RX from 500 kHz to 30 MHz or higher.
- Two receivers, or at least a RIT (RX incremental tuning) to work split; you TX on one frequency and RX on another, usually 1-10 kHz apart. Also called a clarifier and essential to work rare DX.
- Selectivity for both CW & SSB.

- Excellent sensitivity without overloading by strong nearby stations.
- Voice processing for SSB TX, VOX (voice operated TX) and break in CW keying.
- Computer control possible (CAT system computer control).
- Noise blanker.
- Programmable memories for frequencies.
- Linear Amplifier and Transverter controls.
- Built in aerial tuner.
- 12V operations for portable use.

Well the good news is that most transceivers that are less than ten years old will have all the above with the exception of perhaps an antenna tuner and the 12V operation. So it's down to price, and more importantly, what will happen if one day it doesn't work. If buying secondhand, make sure you can get the manual; my present transceiver has 88 switches, knobs and buttons on the front panel and over 400 menu selected options. Some hams will insist that only one manufacturer is any good, but to me, that's a bit like the "Ford v Holden" petrol-heads. I've owned radios from most major manufacturers and all have been great.

The more expensive ones will have better selectivity, roofing filters and sensitivity, and while nice to own, probably aren't necessary for the casual or beginning DXer. The main thing I noticed when I upgraded from a 1983 model to the latest competition grade transceiver in 2004, was just how much better the receiver was; sure it was great to have all the bells and whistles but to me that was the most significant improvement.

Do I hear you say that you don't need CAT, well think again. CAT opens up a whole new world, it can turn your transceiver into a RTTY or PSK31 digital station, send (and decode) CW, run your log and net to stations you see on the web. More about CAT in a later column.

Is this the future of transceivers? This is the Flex3000 Software Defined Radio, you buy this box which is just the TX finals and RX front end, the rest is done in your computer.

DX Spots via WWW

A useful tool in your DX search, telnet or cluster where DX is "spotted", and appears on the web at <<http://www.dxsummit.fi/DxSpots.aspx>>



The Flex3000 SDR; only an on/off button, everything else is done with keyboard and mouse.

Figure 1 is just a two minute screen shot actually taken during the ARRL 10m contest. HA1AG isn't going to work F5IN anytime soon after that remark, remember, in many cases the DX is reading the spots too. Some spotters make comments like "easy" or "only one call". Usually the spotter is close to the DX and with a good antenna, lots of power, and on some sort of ego trip. It's not so easy from the other side of the world with a dipole antenna and 100W.

One of the conventions is that you never spot yourself, and while I abide by this, I can't really see the reason. Spotting is a two edged sword, it enables you to see where the DX is, but it does that for everyone, and is one reason why there are huge pileups for the rarer DX to an extent not seen before. Nowadays some don't even tune around the bands, preferring to wait till DX pops up on the screen.

Propagation software

Andrew ZL3DW emailed me about the discrepancy between propagation as indicated by software and the reality. In particular, long and short path sometimes seem to be the wrong way around. I've

Figure 1: Last 25 DX spots – reloaded every minute

Spotter	Freq	DX	Remarks				DX Country
HA1AG	28028.2	F5IN	deaf	0803	11	Dec	France
RC9F	28010.0	C4N	ARRL 10 m Contest	0803	11	Dec	Cyprus
JA5AQC	18130.0	JT1DA	CQ DX ENK	0803	11	Dec	Mongolia
R7NA	28480.0	ZS6NJ	ARRL10 Meter Contest	0803	11	Dec	South Africa
DL7JV	28018.0	MM3T		0803	11	Dec	Scotland
PD1DX	28495.0	PI4AMF		0803	11	Dec	Netherlands
ON7RN	7140.0	SP9YFF/P	SPFF-540	0803	11	Dec	Poland
IZ6CLN	3660.0	IW6NZY/P	dci-pe037 Silvino	0803	11	Dec	Italy
OK2AN	18071.0	4K9W	Vlad CQ CQ	0802	11	Dec	Azerbaijan
VK3FZ	28481.6	E71A		0802	11	Dec	Bosnia
UT7IL	28476.0	UW4I	59 CQ-Contest, CQ Africa	0802	11	Dec	Ukraine
OK2ZO	28031.5	OL5M	band	0802	11	Dec	Czech
LU8WAG	14075.5	JJ4CDW	JT65A Thanks Akira30W invV, 73	0802	11	Dec	Japan
F5TG	3788.5	CT3FT	call correction	0802	11	Dec	Madeira Is
R7NA	28485.0	ZS6JPY	Contest	0801	11	Dec	South Africa
JA8DNV	3508.2	GM4YXI	GE Keith S4-5 in JA	0801	11	Dec	Scotland

noticed this for years but have no explanation. If anybody can throw any light on this phenomenon, and whether it only occurs in ZL, please email me so I can include it in a future column.

WebSDR

Software Defined Radio is now on the web. Go to the website to listen live to the bands on their receiver. You'll need Java on your computer. It's fascinating to tune a radio in the USA and listen to your ZL signal, even use it to compare your antennas. There are other sites around the world but this one seems to work all the time. <<http://wbbmak.com/>>

Use of remote stations in other countries, whether for receiving or transmitting is great technically, but not permitted for DXCC awards or contesting:

DXCC rules 9. Eleven stations must be contacted from the same DXCC entity. The location of any station shall be defined as the location of the transmitter. For the purposes of this award, remote operating points must be located within the same DXCC entity as the transmitter and receiver.

Propagation

In the last few months the higher bands have been opening occasionally but there is still a long way to go before the highs of previous cycles are reached. I'm struggling to work Central Africa; 9Q, 9L on 20m at present although I see several other ZLs have made the grade. In April 2009 I had more luck with TL, 9G and others so I feel that there hasn't been much improvement. However, I just had a serendipity moment; I worked Zaire in 1979 and suddenly realised that's now the Congo, so it doesn't matter that I couldn't work the 9Q in 2010. Wasted a few hours and a sackful of watts on that one.

DXpeditions

Congratulations to the team of fourteen amateurs, mainly from Germany, who operated ZL8X from two sites on Kermadec Island. They had an amazing 148 750 QSOs during their operation at the end of last year. A tremendous, and expensive effort that has benefitted a lot of

hams worldwide. I hope to have an article in a future column

North Korea: P50KJL, all usual DX frequencies from 2359z on 31/3/11. To celebrate 50 years of rule by the Great Communicator Kim Jong IL. Easy shot on most bands from ZL, but as the number one most wanted country, pileups will be the problem.

Macquarie Island: Half way between ZL and Antarctica it at last has an operator, VK0KEV Kevin, who will be there for 18 months and is already active. He is new to DX and as I hear the shambles on his frequency of DXers not listening, calling over stations in QSO, and jamming, I would not be surprised if he gave up and went outside his hut to talk to the penguins. Good signals in ZL on several HF bands, let's hope for our sake he perseveres.

Saba Island: between 27 January and 3 March. Possible call PJ6/G4IUF. Single op on CW and SSB from 3.5 through 28 MHz QSL via G4IUF.

Sri Lanka: Peter, DC0KK is active as 4S7KKG from Sri Lanka until 13 March.

Other operations:

- 22/02-05/03/11 VK9C/G6AY: Cocos (Keeling) Islands (OC-003)
- February 2011 PJ4/PE1MAE: Bonaire (SA-006)
- February 2011 TJ Cameroon, callsign not yet available
- February 19/20 3W3B Vietnam, ARRL cw contest
- 04/02-17/02/11 S9DX: Sao Tome
- 01/03-17/03/11 T30AQ and T30RH: Tarawa (OC-017), West Kiribati
- March 2011 9L5MS: Sierra Leone and CY0 Sable Island
- April 2011 T31A: Central Kiribati (OC-043)
- May 2011 T6PSE: Afghanistan
- RSGB Commonwealth Contest is on 12-13 March, CW only, often features African, Caribbean the Indian sub-continent, and most years the Falklands, Jersey, and Gibraltar pop up. Another is the CDXC LF and HF Challenges running all of March.

DX Question

Why are you in the pile-up, if you

Letters To The Editor

All Letters to the Editor must be signed and include the author's full name, call-sign, (if applicable) and address. Opinions expressed here are those of the author and do not necessarily reflect official NZART policy.



Letters to the Editor: guidelines to contributors

Letters to the Editor should be concerned with Amateur Radio and normally not exceed 400 words. Break-In follow the guidelines given on page 4-3 of the 2002-2003 Call-book "Standards of language, and topics best avoided". Accordingly sex, race, religion and politics are not acceptable subject matter.

Break-In; from an overseas reader

Dear John

The November/December issue of *Break-In* has arrived here just in time for the Three Kings celebration. Here in Spain toys are brought by the Three Kings, not by Santa ...

I have opened it and, whoa!, what a nice present!!! Not only your *Call Book*, WIA's one too, and the last five years of *Break In*!

You have one of the nicest ham organisations in the world. I have

some 15 years or so of *Break-In* journals stored at home, and, when I pick one at random, there is always something good to read or easy to build or to tinker.

Many thanks, and have all of you at NZART and your family a wonderful 2011.

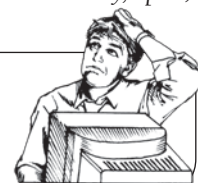
Jon, EA2SN

(Prof. Jon Iza // Chem.& Environ.

Engng. Dept. // Faculty of

Pharmacy, Univ. of the Basque

Country, Spain)



Next deadline for copy is
10 March 2011

already have the country confirmed on this band and mode?

ZL2RR will soon sort out any query you may have.

ANZA Net

This is a daily DX net at 0515z on 14183 kHz, the acronym stands for Australia, New Zealand and Africa.

What's on the air now?

<www.dxsummit.fi/DxSpots.aspx>. Spots giving frequency and call-signs in real time. Each month the 425 magazine courtesy of the Italian Radio Society is available in pdf at <www.425dxn.org/monthly>. Worth printing out with DXpeditions, QSL routes and heaps more.

Announced operations

Visit <www.ng3k.com/Misc/adxo.html> to see a list of most of the planned activations but remember it's not inclusive and won't beat a good pair of ears.

QSL information <www.qrz.com>

Use this page by typing in the call-sign you are interested in, QSL information will appear and usually a biography and photos of the operator and station. Page 3-9 of the 2010-11 NZART *Call-Book* sets out how to use the QSL Bureau in ZL and an email to the Manager

Sunspots <www.solarcycle24.com/>

An interesting site with sunspot detail, photos of the sun and predictions, even video of flares and photos taken from spacecraft behind the sun.

ZL DXers, I still need your biography and a photo at 1MB or better for this column, and a DX tip or two.

Special call-signs

Debbie at NZART HQ is able to issue alternate calls for ZL for special events, I've just picked up ZL50GH for 2011; my fiftieth anniversary of being first licensed. From my partner Sue "His QSL card shows Graeme in his shack in 1961 and 2011, the radio equipment shows a great improvement, but it has obviously been all downhill for the operator".

Licence costs \$50, contact Debbie at <nzart.hq@clear.net.nz> for further information.

Acknowledgements

W3UR, 425 Dx News, ZL2AL, ZL2iFB, ZL3NB. Contact me by email at <graemeh@extra.co.nz>, and I am still needing your biography!

Monitoring Service

Monitoring Service Co-ordinator: John Martin ZL1GWE
<john.martin@nz1.ibm.com>



A happy New Year to you all. This month, we are taking a different perspective in order to explain an innovative and proactive approach to dealing with interference. Non-amateur interference on the amateur bands is what keeps us busy most of the time, but for a change let's consider what happens when an amateur transmitting legitimately on an amateur band causes interference on his neighbours' consumer electronics.

The idea for this piece came from Rob K6RB. Rob told us that in America in the mid-1980s, after AT&T was forced to break itself up, telephones that had been the sole province of Bell's Western Electric were suddenly open to design and manufacture by anyone. So, in short order, Americans were buying phones made by toy companies that lacked the rigorous filtering of the Western Electric products. Suddenly, Rob started receiving RF interference complaints involving neighbours' telephones.

Rob's Federal Communications Commission field office sent him a copy of the booklet they were sending to those who called to complain about interference. Around the same time, the British Post Office released similar booklets concerning television interference. In essence, the booklets stated that, in nearly all cases, the amateur radio operator is not at fault. While that may be factually correct, imagine how someone who has spent a small fortune on a new phone or TV feels about it. To them, the fact that the interference only occurs when the amateur is transmitting clearly means that the amateur is to blame. If the amateur was not on the air, their equipment would work just fine.

Seeing the way things were going, Rob decided to make a pre-emptive move. He wrote a letter explaining the situation to all his neighbours. Naturally Rob's letter was written for an American audience so we have adapted the content to suit the New Zealand situation, and provide it here as a model for you

to adapt and use if you wish.

[Your address]

[Your phone number]

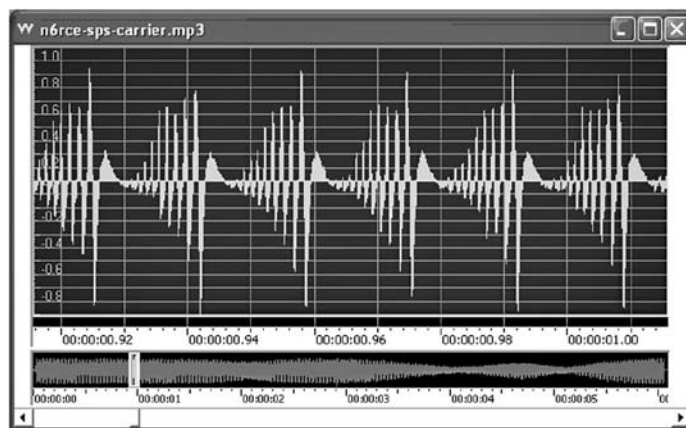
Dear Neighbour,

You may have wondered what the antennas on my property are all about. Amateur radio is my hobby. I use the antennas to talk to other amateurs around the world, mostly transmitting Morse Code or speech on the amateur bands. I have enjoyed this fascinating hobby since [year], taking the technical exams to obtain my license from the authorities in [year].

While amateur radio is an enjoyable pastime and a fascinating way to teach myself electronic engineering, it also brings valuable benefits to the community. We have a role supporting the emergency services and Civil Defence. Amateur radio is sometimes the only available means of communicating urgent messages in times of civil emergency or natural disasters when the telephone and cell phone systems fail. Following the Christchurch earthquake last year, for example, radio amateurs were involved in gathering and passing on information, particularly in the period before the authorities established their own emergency communications infrastructure. We also get involved in searches for missing trampers, and offer radio support for events such as car rallies.

Sometimes, though, you may hear evidence of my activity on your telephone, television, stereo or computer. It is logical for you to assume that, since my transmissions are causing the problem, I can therefore change something to make the interference go away. I wish it were that easy!

My transmitter works on the amateur frequencies, not the bands used by your TV and radio, and fully complies with the regulations. Home entertainment equipment should be oblivious to radio transmissions outside the broadcast bands. Telephones and computers should not be affected by radio signals at all. Even cell phones, which are radio-based, use their own



Sample of a Switched Power Supply causing wide spread interference:
<<http://web.archive.org/web/20070704033738/www.arrl.org/tis/info/HTML/rfi-noise/appliances.html/n6rce-sps-carrier.mp3>>

frequencies which are quite distinct from the amateur bands.

National regulations in New Zealand and other countries mandate that home entertainment equipment, telephones and other electronic equipment must be designed to filter out radio signals that are not intended for them. The Ministry of Economic Development (MED) states that "All electrical, electronic and radio products on sale or in use in New Zealand must comply with Electromagnetic Compatibility (EMC) standards, to minimise the risk of interference to the radio spectrum." Some equipment manufacturers, however, have been lax in their compliance. After a product is tested and approved for sale, they typically omit the filters from the finished goods in order to save literally just a few dollars per item. That may be a legitimate business decision but it goes against the regulations – and they know it. Unfortunately extra profit for them leads to customer complaints about interference from those few customers who live near radio stations, and sometimes from radio amateurs like me who receive interference from computers, power supplies and TV sets that clearly should not be transmitting.

I want to be able to operate my equipment normally without you even being aware of it, and vice versa. I am sorry if you are having an interference problem. If there was something I could do on my end to alleviate it, I would do it immediately. I am unable to fix your equipment personally because I cannot accept liability for making changes that should have been done by the supplier. However the government has published useful advice for consumers on how to locate and fix interference

problems. Please see <<http://www.rsm.govt.nz/cms/consumers/reception-problems/fixing-your-interference/>> or by all means ask me for a copy of that page. I would like to help you resolve any interference issues.

I'm truly sorry for any inconvenience or annoyance that interference might cause you. I would much prefer that the manufacturers had done the right thing from the outset. If they had, you could be talking on your phone, watching your TV, listening to your stereo or using your computer at the same time as I was operating my amateur radio equipment, and neither of us would have any impact on the other.

Yours truly,

[Sign the letter]

[Print your name, and perhaps your call-sign]

Rob tells us that after circulating the letter, several neighbours called to thank him for the information. Some said they learned a lot from it, and more importantly the interference complaints stopped. A year or so later, the Loma Prieta earthquake hit his street pretty hard, knocking out electricity, water and gas for nearly five days. During that period, Rob used a battery-powered IC-735 and mobile antenna to send about 20 health-and-welfare messages to neighbours' families letting them know they were okay. That cemented his good neighbour relations, and shows that sometimes it pays to make the first strike.

Thanks Rob for an excellent idea.

We have asked the NZART webmaster to add a link to the website, with a template for your use with

Magazine Survey

Compiled by Grahame Fraser ZL3SJ
<grahame.fraser@canterbury.ac.nz>



QSL Bureau

by Barry Stewart ZL2RR
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Amateur Radio (WIA) December 2010

- p6 A matching system for two 23 cm antennas
- p8 Building a 50 ohm 150 watt RF dummy load
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- p33 Gimme an X, Gimme an O, What's that Spell?—Radio (receiving circular polarisation on HF)
- p38 Antenna Measurement for the Ham on a Budget
- p42 Review: Yaesu FTDX5000D HF and 6 Meter Transceiver
- p50 Hands-On Radio #95 – Watt's in a Waveform?

January 2011 (DIY issue)

- p30 Mystery Inductor Box (use sig. gen. and 'scope to check resonant frequency)
- p32 Reflow Soldering for the Radio Amateur
- p36 Moonbounce on a Budget
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- p44 A Coax Entrance Facility (dry and pest-proof)
- p46 Review: Yaesu FTM-350R Dual Band FM Transceiver

- p53 Technical Correspondence: Bonding of Grounding Conductors
- p59 Hands-On Radio #96—Open Wire Transmission Lines
- p61 Getting on the Air: Feeding a Balanced Antenna with Coax Cable
- p65 Tools for doing it yourself
- p72 The National HRO Receiver – A Historical Perspective
- p94 Eclectic Technology: The WSJT Evolution Continues
- p95 Vintage Radio: What Happened After the Rescue (of the airship *America*)
- p97 Microwave Homebrewing

RadCom

December 2010

- p19 Homebrew: We start building a HF transceiver
- p32 Vehicle RF interference suppressor
- p38 Design Notes: Rotary encoders on the cheap
- p63 Antennas: The GM3RVL 'Joiners Delight' loop antenna (copper tube)

Sprat

Autumn 2010

- p6 Digital AGC
- p14 The Classic—A Simple Class E Transceiver
- p26 A "zero cost" transparent dial (from CD protection discs)

The Canadian Amateur

November/December 2010

- p14 Antennas and Transmission Lines: Fan dipoles for HF applications
- p25 A 20 watt HF amplifier (160 m to 10 m)

References:

- [1] <<http://www.rsm.govt.nz/cms/consumers/reception-problems/fixing-your-interference/>>
- [2] <<http://rsgb.org/emc/i-am-experiencing-interference.php>> Useful leaflets
- [3] <<http://www.nzart.org.nz/council/policies/2002-rfi-policy/>>

your own neighbours, hopefully you will find this very useful. You might even get to know the neighbours as a result and vice versa!

Best wishes for 2011

John (ZLIGWE) and

Gary (ZL2IFB)

Report intruders to: <MS@NZART.org.nz> or <MS2@NZART.org.nz> or <IntruderWatch@GoogleGroups.com>

A happy New Year to all readers! My thanks go to those members who extended greetings for the Festive Season to the QSL Bureau volunteers; we were most appreciative of your kind thoughts.

On behalf of the NZART, I sincerely thank those members who, from time to time, throughout 2010, forwarded a donation towards the Bureau costs with their QSL cards; they were greatly appreciated by our Association. The increased GST rate introduced by the Government gave the Post Office a chance to once again increase their postage rates. The 'rounding up' was not too inflationary for the Bureau Operation but the 20% increase in the cost of posting an internal large envelope seemed a little over the top!

The QSL Bureau's annual posting to the less 'popular' overseas bureaux resulted in sixty-three envelopes posted at year's-end; several of the less 'popular' bureaux missed out on a posting through the fact that no cards arrived for them!

NZART QSL Bureau preliminary figures for the year ending 31 December, 2010, indicate that QSL cards received from ZL operators were up around a thousand whilst incoming DX Cards were down around six hundred compared with 2009 figures. The incoming DX cards numbered nine thousand more than those received for forwarding overseas. All ZL sub-bureaux received postings during December 2010 and, as of 31 December, the Central Bureau had minimal numbers of QSL Cards for ZLs on hand.

All NZART QSL Bureau information is available on page 3-9 of the 2010–2011 NZART *Call-Book* and is also obtainable from the Association's website at <www.nzart.org.nz>. To access this, on the home page scroll down to the 'Quick Navigation' section (yellow background) and under the 'Activities' heading (third column from the right) Click on 'QSL Cards' and all will be revealed! This web page is updated if any changes occur during the life of the *Call-Book*.

Are you acting as a QSL manager

for your own foreign call? Are you running a special event station with a special call-sign? Please have the courtesy to notify the QSL Bureau Manager so the volunteer staff know what is happening when they start getting inundated with QSL Cards for what would otherwise be an unknown call sign. We cannot be expected to be aware of all that is happening in this great world of ours – though we do our best! We do get a lot of cards for station calls that are misread call-signs (especially CW QSOs) and we would not like to return cards for a legitimate station through lack of information on your part.

A number of operators are holding single suffix calls with different call-district numbers to that of their regular call-signs. QSL Cards for these single-suffix calls are sorted, along with all other incoming cards, and forwarded to the appropriate Prefix Sub-bureau so if you are a ZL1 with a ZL/ZM4 single suffix call, you need to supply the ZL4 Sub-bureau with self addressed stamped envelopes to claim such cards.

Please remember to keep your appropriate QSL Sub-manager supplied with self addressed stamped envelopes (SASEs) to enable them to keep forwarding any inward 'cards to you rather than having to 'bin them' from time to time! If you have any questions, queries (QSL managers' addresses, etc) or comments please feel free to contact me either via mail: 1 Caversham Road, Westmere, Wanganui 4501 or PO Box 857, Wanganui Mail Centre 4540), or Email: <zl2rr@xtra.co.nz>.

Finally, on a personal note, the Stewart and Trethewey families sincerely thank all who paid personal visits, phoned, e-mailed or sent cards following the killing of my XYL by a hit and run driver last November. My special thanks go to several Amateurs who travelled from distant QTHs to attend Margaret's funeral service and to those that made a donation to the Blind Dog Service in memory of Margaret.

73,

Barry ZL2RR

Contests

Contest Manager: Frank Hunt ZL2BR
<zl2br@ihug.co.nz>



SO – SOA

Some contests have Single-Operator-Assisted (SOA) categories and some do not. The most significant component of the generally accepted definition of Assisted, is that the operator receives and uses information regarding the current operating frequencies and call-signs of other stations, ie: use of the DX-Cluster spotting information is permitted or not permitted.

Now, some contests do not have an SOA category because their rules either don't say you can't use the DX-Cluster, or the rules say yes, you can use the DX-Cluster. Whereas some other contest rules say if a single-operator uses the dx-cluster, they must enter the Multi-Operator category. Confused?

Well the good news is that the vast majority of international contests do permit use of the DX-cluster by single-operator stations and the few that don't are in the main the *CQ Magazine* and ARRL organised contests, but this seems to be slowly changing. There has been much debate over the years as to whether use of the DX-cluster is ethical in contests, or whether DX-cluster assistance is any different than other types of assistance, eg computer logging programmes.

Interestingly the number of SOA logs exceeded SO logs received for the 2009 CQ WW CW Contest and the contest organisers have decided to give each category equal merit, instead of the SOA category being treated as second-rate. By the time you read this the 2010 CQ WW CW Contest will have been and gone and I would say it's a good bet that more SO stations will be using the DX-cluster than ever before.

But wait, there's more! What about Skimmer and the Reverse Beacon Network? Skimmer is a CW call-sign recognition and decoding programme written by VE3NEA, which can decode the call-signs of multiple signals simultaneously. In fact when used in conjunction with a receiver which has a wide AF or

RF spectrum output and a computer with a wide-band sound-card, it can decode every signal CW on a particular band; eg every signal between say 14.000 and 14.070 MHz simultaneously and display all their call-signs and frequencies in a band display window <www.dxtlas.com/CwSkimmer>.

Some say that the Skimmer is not ethical and should be banned and at least one contest has just introduced a special category for people using Skimmer.

But what say if the information from dozens of Skimmer equipped stations around the world is displayed on a single web-page or fed into your computer logging programme. Well this is exactly what the Reverse Beacon Network (RBN) can do. It's the DX-Cluster on steroids! When monitoring or using the RBN in a big contest it's hard not to be impressed. One really nice benefit of the RBN is that everyone is spotted; small guns, big guns, rare DX and those of us with common call-signs and thus some of the advantage that big guns and rare DX stations usually enjoy over the rest of us is reduced. I like that!

Check out the RBN website, the RBN is operating 24/7, not just during contests. You may want to

try putting out a CQ call to find out whereabouts in the world your signal is readable <www.reversebeacon.net/index.php>.

NZART Jock White Memorial Field Day 2011

This year's event will be held over the weekend of 26/27 February.

Refer current NZART *Call-Book* pages 5-4 and 5-5 for the rules of this annual fun activity.

Of course the more stations that operate, the more fun we can all have. So it's a pity that last year only 38 clubs/branches were active out of a total of 72. It should be borne in mind that clubs/branches are not limited to just operating one station each. Additional club/branch stations can be operated by NZART members who should use the branch number of their local club/branch.

However it is expected that operators of stations other than the one using the club/branch call-sign will have advised their club/branch of their intention to operate a FD station. Operators of stations established in areas other than the one where the operator(s) normally reside should especially liaise with the club/branch concerned. There are sixteen branch numbers in recess, so wouldn't it be great if some of these branches could be re-activated over the FD weekend.

RSGB Commonwealth Contest 2011

The 74th running of the oldest

international AR contest will take place on the weekend of 12/13 March. This relaxed style CW-only contest is open for operators in Commonwealth countries only. For the fifth year running there will be a team competition. Last year we couldn't quite muster a full strength ZL team. Please let me know if you are interested in being in the ZL team <zl2br@ihug.co.nz>.

Thelma Souper Memorial Contest 2011

The Thelma Souper Memorial Contest will be held on 2-3 April 2011 from 0800z–1000z on Saturday and Sunday evenings. All Contacts to be held on 80 m phone or CW may be used. YLs contact YLs and OMs. OMs contact YLs and OMs. One contact with each station permitted in each half hour period. Call "CQ WARO CONTEST" exchange report, serial number (commencing 001) and name. To qualify as a multiplier WARO member stations must have contacts with at least 10 different stations.

A Bonus Station using the WARO call-sign ZL6YL will be in operation for random periods and will count as one multiplier on each night of the contest if worked. All radio regulations must be observed.

Scoring

To Qualify: Enter date at beginning of each evening. Each log must contain: Time of Contact, call-sign of station worked, cipher sent,

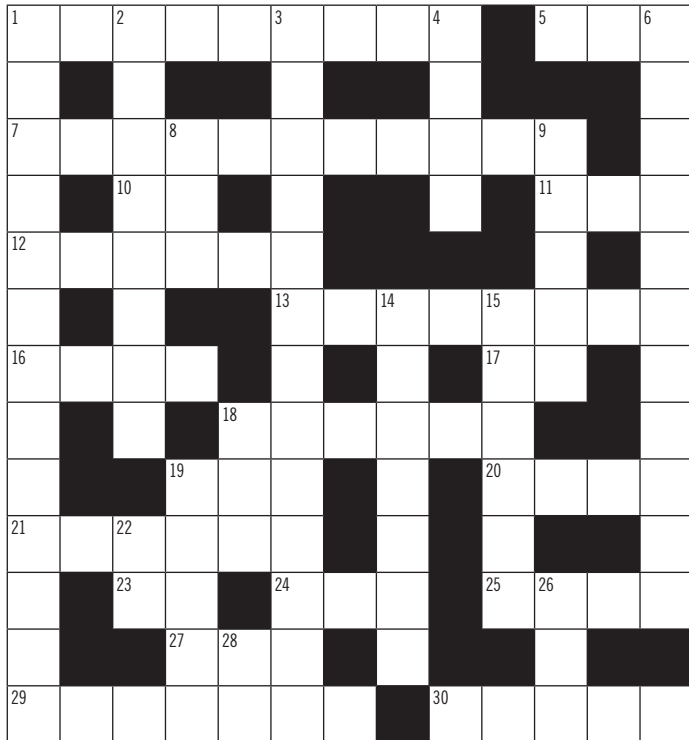
■ continued on page 42

International HF Contest Calendar for February-April 2011			
Contest	Date	Time (UTC)	Website
CQ WPX RTTY Contest	Feb 12/13	0000 Sat–2400 Sun	<www.cq-amateur-radio.com/cq_contests/index_cq_contests.html>
PACC Contest CW/SSB	Feb 12/13	1200 Sat–1200 Sun	<pacc.veron.nl>
ARRL DX CW Contest	Feb 19/20	0000 Sat–2400 Sun	<www.arrl.org/arrl-dx>
REF Contest SSB	Feb 26/27	0600 Sat–1800 Sun	<concours.ref-union.org/contest/>
UBA Contest CW	Feb 26/27	1300 Sat–1300 Sun	<www.uba.be/sites/default/files/uploads/hf_contests/ubatest_dx.pdf>
CQ WW 160m Phone Contest	Feb 26/27	0000 Sat–2400 Sun	<www.cq-amateur-radio.com/cq_contests/index_cq_contests.html>
ARRL DX SSB Contest	Mar 5/6	0000 Sat–2400 Sun	<www.arrl.org/arrl-dx>
RSGB Commonwealth Contest CW	Mar 12/13	1000 Sat–1000 Sun	<www.beru.org.uk>
Russian DX Contest CW/SSB	Mar 19/20	1200 Sat–1200 Sun	<www.rdx.org>
BART Spring CW Contest	Mar 19/20	0200 Sat–0200 Mon	<www.bartg.org.uk>
CQ WPX SSB Contest	Mar 26/27	0000 Sat–2400 Sun	<www.cq-amateur-radio.com/cq_contests/index_cq_contests.html>
SP DX Contest CW	Apr 2/3	1500 Sat–1500 Sun	<www.spdxcontest.info>
JIDX (JA) Contest CW	Apr 9/10	0700 Sat–1300 Sun	<www.jidx.org>

ZL Crossword No.10

Compiled by Graeme Hunt ZL1ANH

email <graemeh@xtra.co.nz>



Across:

1. Sunspot activity indices (5, 4)
5. One state in digital transmission (3)
7. Small measurements of capacity (11)
10. DX abbreviation for stations in Europe (2)
11. Not the undertaker, the department dealing with the other certainty (3)
12. EA8 Island group named after dogs (6)
13. From Wellington race NE for the army (8)
16. 25 December each year (4)
17. Position where you are (2)
18. Geyser at Whakarewarewa (6)
19. Jesus was one, as are many in 4X (3)
20. It never sleeps (4)
21. Phenomenon associated with very high voltages and a producer of ozone (6)
23. Morse abbreviation if given some ivory (2)
24. Minimum component number for a parallel circuit (3)
25. A Pinniped often seen near Kaikoura (4)
27. A large amount, and a small piece of land (3)
29. Go back (7)
30. Invented by a New York professor of painting and sculpture in 1835 and still used. (5)

Down:

1. Conducts in a magnitude between that of a conductor and an insulator (13)
2. What you need to be before going on the amateur bands (7)
3. 13 volts and 4 amps, what have you (5-3,5)
4. 24th letter of the phonetic alphabet (4)
6. Not a harmonic (11)
8. 24 Across in Maori(3)
9. VHF/UHF and SHF propagation is mainly line of ... (5)
14. Time of the seasons that is good for DX (7)

Awards

Awards Manager: Alan Chapman ZL3GX
<a.p.chapman@clear.net.nz>



There has been some interest in the Railways Award and with the recent National System Award working from railway stations. The rules for the NZART Railways Award are as follows:

To work amateurs within 1 km of Railway Stations which are the stopping places for the "Northerner", "Coastal Pacific" and the ex "Southerner". (Auckland to Invercargill)

The stations are:

- Auckland or Papakura or Pukekohe
- Huntly or Hamilton
- Te Awamutu or Otorohanga
- Te Kuiti or Mangapehi
- Taumararua or National Park
- Ohakune or Waiouru
- Taihape or Hunterville
- Marton Junction
- Fielding or Palmerston North
- Levin or Otaki
- Paraparaumu or Paekakariki or Porirua or Wellington
- Picton or Blenheim
- Kaikoura or Waipara
- Rangiora or Christchurch
- Ashburton
- Timaru
- Oamaru
- Dunedin

- Balclutha
- Gore
- Invercargill

Cost of the award \$3.00 or 3x \$1.00 stamps *no* Kiwi stamps please.

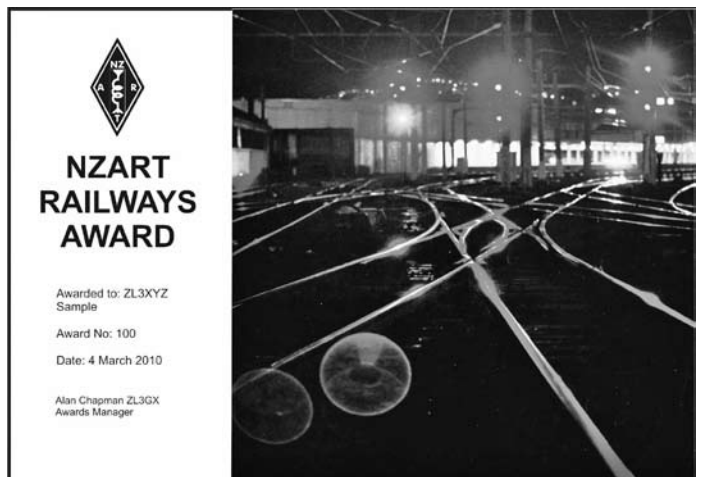
For this award use the current railway station and in the case of the station having been removed as close as possible to the site where the station was.

Club Awards

Clubs running short-term awards or new awards should send details of the award to me via email or at my *Call-Book* address or the address below. Remember that *Break-In* is only published on even months and copy, including, if possible, a copy of the certificate, for inclusion, should reach me by the end of the even month.

The Awards Net runs on 80m, 3.677 MHz every night from 0800 UTC every night of the year. Every one is welcome to join in especially if you are mobile and in a rare county or district.

NZART Awards Manager, PO Box 1733, Christchurch 8140, <awards@nzart.org.nz>, <www.nzart.org.nz/nzart/awards/#nzartawards>.



15. You don't want this star sign in your field day paddock(6)
18. Mightier than the sword (3)
19. One Newton acting over one metre (5)
22. Radiotelephone, abbrev. (2)
26. One in each headphone muff (3)
28. Maybe State of Oregon, maybe something else (2)

Answers to crossword on page 42.



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Librarian:
John Nicholson, ZL1AUB

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Nets:
3.850 MHz (AM) Friday nights
at 2000 hr local time.

This month we have some photos of World War Two equipment. There is a display organised by the two Bruces in Whangarei, Bruce Rowlings ZL1WB and Bruce Scahill ZL1BWG, to mark the anniversary of the Battle of Britain.

Also we continue with the story of German radio equipment in Guernsey during World War Two; as seen by John ZL1BDY on his recent trip to that Channel Island. Part one appeared in the November/December 2010 issue, and is concluded here.

Whangarei Display

The equipment displayed was to mark the 70th Anniversary of the "Battle of Britain" on behalf of the Whangarei Amateur Radio Club, ZL1AM, held at the Whangarei RSA on Sunday 19 September 2010 (refer photo 1 l>r).

HRO-5S – National Radio Company. all-wave receiver. Used in large numbers at "Station Charlie" – listening for messages from allied

secret agents prowling around Europe in WW2.

IFF – Identification Friend or Foe. Portion of equipment to initiate coded re-transmission of ground radar stations by friendly aircraft returning from missions over hostile countries.

ARB – Navigation and long range radio receiver. Morse code and voice.

RA-1B – Navigation and long range radio receiver. Morse code and voice.

ARC5 series – high frequency radio receiver used in short and long-range light and heavy aircraft.

ARC5 series – High-power transmitter for voice and Morse code. Long range short wavelengths – light and heavy aircraft

ARC5 series – Low frequency navigation receiver for long-range aircraft

BC348 – High grade general purpose high/medium/low radio frequency receiver. American equivalent of R1155. Fitted in heavy bombers, for navigation and long-range voice or Morse code reception.

SCR522 – Very high radio frequency transmitter and receiver unit designed in England, refined and constructed in America. Short range voice communication with fighter aircraft and ground stations.

R1155 – British made radio receiver. General purpose, navigation, voice and Morse code long range communication in bomber aircraft.

German radio equipment in Guernsey (continued)

Ha5K39c (s/n 11573 -1943) fixed station transceiver (Fig 5): This was a 5 W transceiver manufactured by Hagenuk from 1939 onwards for the Kriegsmarine (Navy) covering the frequency range 2.0 to 5.0 MHz. This particular variant was designed for sending CW and telegraph (hellscreiber) as well as phone.

The transmitter on the right side of the panel had three stages (modulation stage with a doubling circuit and a power amplifier using one type RV12P2000 and one RL12P10 tubes. The tone generator served in a dual role as the microphone amplifier.

The receiver on the left side of the panel operated as a TRF with three vacuum tubes (RV12P2000) as an HF band filter, HF amplifier, regenerative detector and an AF stage. The transceiver was powered by a vibrator for 12 V battery operations or a mains power (110V /220V) power supply. The power requirement on transmit was 4.7 A at 12 V. The receiver sensitivity was quoted as 50 µV on telephony and

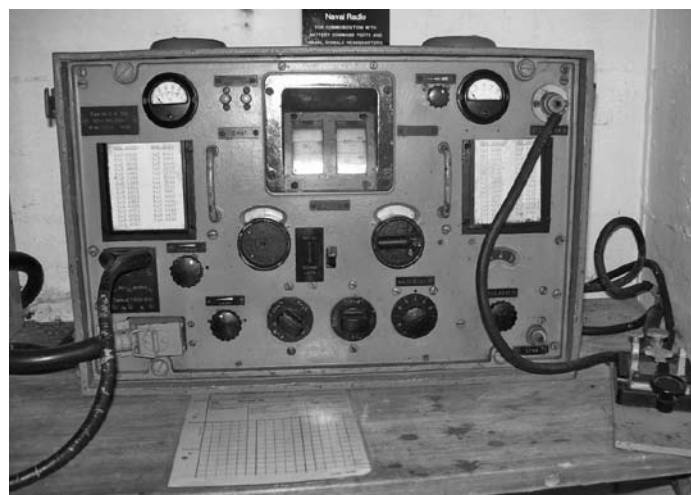
4–5 µV micro volts on CW.

The use of a TRF design in a permanent facility may at first glance appear obsolete but it may have been chosen because it does not use a heterodyne oscillator which could be picked up by enemy surveillance.

The two frequency dials for receiver and transmitter are side by side in the middle of the front panel making it easy to check the two settings for simplex or split working. An unusual feature was the volume control which was a variable capacitive voltage divider giving a range of 60dB at the receiver input. This front end attenuator would have helped prevent front end overload from the neighbouring radar installation.

The two meters on the front panel monitor supply voltages (left side) and antenna current on the right side. The antenna connection is at the right top of the front panel while the earth connection is directly below it at the bottom.

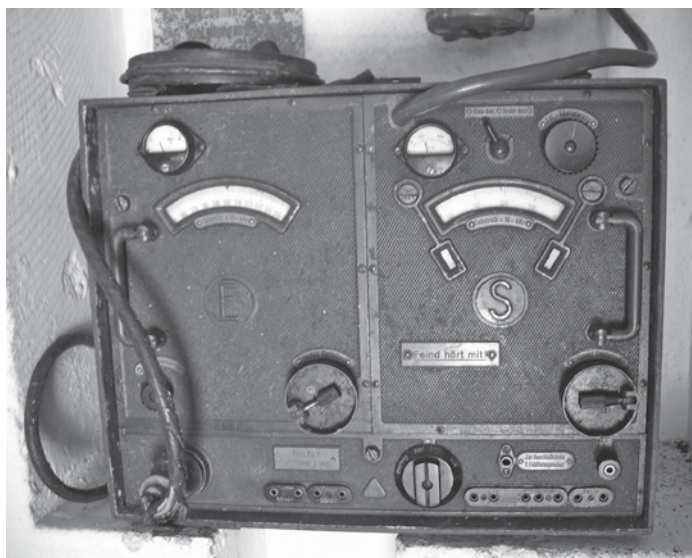
You will notice there is an open contact Morse key with a metal base-plate on the bench. The power in plug and socket are on the



Ha5K39c (s/n 11573 -1943) fixed station transceiver.



Anniversary of the Battle of Britain (refer to text for details).



Torn FuF Portable Transceiver.

lower left of the front panel. So the general layout is reminiscent of the ZC1. You will also notice that the transceiver still contains the two typed frequency calibration cards with which it was originally supplied.

This set was used on small ships and on coastal land installations. In Guernsey it was used to communicate with the Naval Headquarters in St Peter Port and with the gun emplacements.

Torn FuF (s/n 22830-40) portable transceiver (Fig 6): These 700 mW transceivers were developed by Lorenz in 1935 for the Navy and are ruggedly constructed out of cast alloy and have two carrying handles because it weighs 19kg.

The transmitter on the right covers 4.5 to 6.67 MHz with two preset transmitting frequencies enabling the rapid frequency change over to take place even in darkness in the field. The transmitter uses 3 RL24P2 tubes, for phone, MCW and CW modes. The super heterodyne receiver on the left covers 3 to 6.67 MHz. The receiver uses 6 tubes, all RV2P800, and has a phone sensitivity of 100µV for a 1 mV output.

These portable transceivers were designed to be carried by two men; one for the transceiver and the other for the battery pack which also housed the headphones, key, microphone, antenna gear. The antenna used was either a vertical whip or a 14 metre wire to the nearest tree. The whip comprised 11 screw ended rods and an inductively loaded resonator

section which could be added in various positions to get resonance. The whip setting giving the longest range was 7 rod sections below the resonator and 4 sections of rod above it. Antenna current was measured on the right hand meter while the battery voltage and plate voltage was measured by the meter on the left.

Army variant models: TFuG (f and k) cover the same frequency range and uses the same case but has different tubes and different power supplies. Some models had one 2.4V filament battery and one anode battery while other variants had two filament batteries and a vibrator to generate 150 V for the anode supply. Because the set was used as a forward artillery spotting transceiver the batteries were rechargeable to permit operating in the field for extended periods.

The working range of the set was 12 miles on CW and 6 miles on phone which was ample to cover the whole area of Guernsey. The set was designed for artillery observation directing the fire for a specific gun battery using phone or CW and communicating with the Ha5K39c in the observation tower.

This transceiver does not have the physical beauty of the comparable type 48 set used in NZ but it sure looks rugged.

Many thanks to both Bruces and to John for a look at this interesting equipment.

Roy Symon, ZL2KH
Secretary / Treasurer
SPAM (NZ)

Old Timers' Club

Roy Simon ZL2KH
<z12kh@xtra.co.nz>



Secretary/Treasurer:

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Phone:

06-758-2156

E-mail:

<z12kh@xtra.co.nz>

Monday Evening SSB Net:

Net Details: 2030 hr (local time) each Monday; on 3.870 MHz LSB.

This month we have five new members, three Silent Keys, and two long-service certificates that have been earned.

New Members

A warm welcome to the following new members:

- 1269, ZL3RP, Morry Turner, Diamond Harbour
- 1270, ZL2TV, Ralph Sanson, Warkworth
- 1271, ZL2AG, George Newlands, Wellington
- 1272, ZL1AVW, Barry Wing, Kerikeri
- 1273, ZL2UFN, Graeme Blyde, Kaponga

I hope that your association with the Old Timers' Club will be long and enjoyable.

Roy Symon ZL2KH
OTC Scribe

Next deadline for copy is
10 March 2011



New Members



Name	City/Town	Branch	Call-sign
R J Hindmarsh	Papakura	65	ZL1TKA
M A De Koning	Auckland	29	ZL1MDK
W Van Royan	Rangiora	56	ZL3CHE
F W Bath	Marton	23	ZL2AAM
A Scott-Mackie	Auckland	2	ZL1ASM
F W Sargent	Taupiri		ZL2AMC
M S B Wilson	Wellington	74	ZL2FPV
A D White	Rotorua	33	ZL1ABW
C J Stewart	Auckland	2	ZL1CJS
T Fellowes	Christchurch	5	ZL3PSG
J Innes	Lowood, Australia	99	ZL2JDI
J M Poulsen	Palmerston North	20	ZL2TCA

AREC – Amateur Radio Emergency Communications

Geoff Gillman ZL3QR and Bev Gillman ZL3OV

AREC Mission Statement:

To be the preferred provider of Emergency Communications to New Zealand Emergency Services.



Hi, Everyone. We trust that you all had a safe and enjoyable holiday and have returned fully recharged for the new year.

First up is an item that, thanks to the good supply of material last year, has been continually held in reserve until now. Some material, including one on the Silverfern Rally, is already to hand for the next issue. This is great news and please keep it up.

Easter Equestrian Endurance event

Easter 2010 saw the National Equestrian and CTR Championships being held near Culverden in North Canterbury. This was the fifth such event which our North Canterbury AREC Section has been involved with in the past nine years but since the last one at Easter 2006, has required the combined efforts of the three Canterbury Sections, with Christchurch taking the lead role and providing the Base Operations facilities.

We were principally involved with the Field Operations and provided most of the personnel for the four checkpoints. These were placed strategically at the intersections of four interlinked loops (32 km, 34.7 km, 29 km, 16.5 km) which, by various combinations, gave the ride distances of 160, 120, 100, 80, 50, 40 and 32 km. Because of the very early start/extended hours on two of the three days operations, it was best that the first two checkpoints have their personnel camp on-site, but this was not necessary for the remainder.

Barrie ZL3UC and myself operated checkpoint #1. For most of the time it was quite convenient to use the back of my car for the radios but when rain set in later on Day three it became imperative to work the radios from Barrie's motorhome. This site was "spaghetti junction", with riders entering/exiting from any of three different directions, depending on which particular loop was in use at the time. Base and start/finish were located at the Culverden Polo Grounds and the

Rugby Grounds, which were next door. Our position was about 4 km to the north west (about 25 min riding time) out and Checkpoint #2 (with Graeme ZL3NK and Rob ZL3RO) around the far side of Loop A, approx 45 min from us. Checkpoint #3 was over the far side of Mt Culverden near the road to Hanmer and was the only position where it was thought HF may have

been required. There had been no chance of "field testing" the sites for VHF coverage beforehand, and although we knew that coverage from 6975 Mt Noble repeater would not be a problem for the south side of the range, we were unsure of possible shadows on the north side. As it turned out, there were no problems at all. Checkpoint #4 was about 4 km to the NE of Culverden, close to S/H 7.

Very little planning information had been available to us and on the understanding that the event would be based from the Rugby Football

Grounds, the "early starters" began to assemble there late on the Thursday afternoon. First came Barrie and myself, then Graeme, followed by Rob, who was towing his caravan through to Hanmer with his family for the weekend. This enabled him to fill in a number of positions as needed, and also enjoy some family time as well. Finally, near dusk, Dudley ZL3GG arrived with the Christchurch AREC Comms vehicle, to set up as base. We all wanted to get to our places before dark, but most of the officials were away marking the routes with the various LED beacons and signboards making it quite late before we were properly organised. Base area was in the Polo Grounds next door and once the Comms unit was in place and we all had our appropriate paperwork, the field teams were led to their positions. Start time was set as midnight.

Day 1. Rob had arrived just before midnight to assist me (Barrie was to take over later to allow Rob to move on to C/P 2 to assist Graeme), and we checked in with Base, only to find that midnight was actually reveille, and the true start time was 01.00. Perhaps April Fools Day had had something to do with it, but we certainly didn't make that mistake again. Soon the first riders appeared, beginning a procession we would see many times in the following sixteen hours. It was a clear, mild night with a good moon which would have been helpful to the many riders who were not using lights.

Day 2. This was a (relatively) short day. Start was 05.00 so we checked in at 04.45. We had found that the PA system at Base could be heard at times and that there was a PRS link between Comms and PA trailer, and I was able to monitor that which proved quite useful. A fine, mild day. A serious problem showed up when the first riders were due to return via our position at the end of their first loop. There had been no hassles with signage on the first night, but the local hoons had been busy and removed much of the signage early overnight, thus causing considerable confusion. Officials were called in to rectify the problems and



Ops centre C/P1 set up in back of Barina.



View of comms area.



Coming out from the trees (from start/base).

a member of the local constabulary (also a “ham”) was invited to make investigations. In some ways this was a blessing in disguise by enabling the signage and beacons to be improved in places where a need had been found.

Day 3. This produced a poser as Daylight Saving was due to end officially during this shift, again being an early start. This was overcome by everyone resetting their watches before midnight and start was set as 02.00 on that basis. I have two particular memories of this day. The first was possibly one of the best acts of horse control, especially by a junior, that I have ever seen. This was the day of the Trail Ride (CTR) and the senior and intermediate grades had already passed us and being followed by a group of juniors. At our checkpoint, riders coming from the start, emerge from a stand of trees and having to pass some obstacles in the process. Firstly was the massive trunk of a fallen tree (suitably lit by hazard beacons) then at the road gate, had to pass between two traffic road cones which covered potential hazards for the horses’ feet. These also had flashing beacons on them, which, up until this time, had not appeared to worry the horses much at all. Amongst this last group was the youngest rider, a teenage girl on a quite nervous horse. Negotiating around the fallen log was bad enough but when the gap, with a flashing light either side came into view, the horse stopped dead. No way was it going through that gap, and it started prancing from side to side. Possibly it realised that all the others had gone on anyway and it didn’t like being left on its own and decided that over the gap was the way to go! How the rider remained seated we’ll never know, but Barrie and I fully expected to be having to deal with an accident, right there and then. A tribute to that rider, she had the horse quickly under control and there were no more problems. Just to be on the safe side I did advise the other checkpoints to be particularly watchful for this rider.

The other memory was the weather. Up till now it had been



Front view of “Patrick”.



Along the bench. There are still some painting and cosmetic jobs to complete, an upstand at the back of the bench, a tidy up of the vehicle wiring, storage for tea making items, etc.

fine and quite mild and working comms out of the back of the Barina was great. However mid-morning came a light Southerly change with drizzle, so the radios had to be reorganised into Barrie’s motorhome which was far less convenient. However the drizzle was an advantage to the horses as it had quite a cooling and calming effect. By mid-afternoon, our checkpoint was disestablished, and after having a look around the Base area at the Polo Grounds, it was home-time for me.

Geoff Gillman
ZL3QR / ZK9EG

Project Patrick

Over the past decade, first Branch 39, then Branch 88, has used a converted 1983 Bedford ambulance as an AREC mobile communications base. With the red oxides of iron becoming a maintenance problem, a rapid decision was made to retire it. The old ambulance was sold on Trade-Me®, for rather more than I

personally had expected, to become a mobile coffee shop.

The new Tauranga AREC wagon is “Patrick”, a Leyland ‘Convoy’. This was initially funded by a generous loan from one of our Club members. Then in November, we received a donation from a Pub Charity to cover the full purchase cost of this vehicle.

In a previous incarnation Patrick had served as a Team Policing Vehicle. It contained comfortable seating for eight fully-equipped Officers in the front and mid-sections, with less comfortable but very secure accommodation for up to four ‘temporary guests’ in a ‘cage’ at the rear.

During October and early November, Branch 88 members worked to remove everything not wanted for Patrick’s new occupation. Dismantling the welded lock-up was a major task. A countless number of metal cutting discs, a packet of jigsaw blades and manual effort from ZL’s 1MK, 1BWB,

1RTY and 1APD resulted in a pile of scrap steel and an empty van. Meantime, ZL1RKT and I stripped everything from the Bedford, and ZL1IE managed the sale.

The previous owners had used side cutters to remove their radios, flashing lights, sirens etc, leaving bare ends of live wire as well as disabling some of the normal vehicle electrics. Rather than a patch up repair, we decided to remove everything except the basic ignition wiring and start again. My share of the job has been the fit out and installation.

At the time of writing, Patrick is 90% complete with only minor items to be finished. Our philosophy is that AREC should be “on-air” within a few minutes of arriving on location. To meet this, all equipment is permanently wired with RF cables taken to feed-through panels on both sides of the vehicle. Only the aerials need to be connected, these are whips and collinears for VHF, whips or dipoles for UHF or HF.

Power comes from a bank of SLA cells of nominal 12V, 500 Ahr capacity. This is sufficient for normal operations of at least three days. A 2 kW petrol generator supplements this and provides charging in remote areas. A switch-mode supply charges batteries when mains power is available. An inverter provides some 300 W of 230 VAC when needed. We are thinking about a solar panel on the roof.

The Leyland has much heavier suspension than the ‘patient friendly’ ambulance, thus allowing the battery bank and generator to sit over the back axle with storage for other equipment in the same area. Operator access is through a sliding side door with an awning rigged in wet weather. A donated laminated bench top provides plenty of desktop for the usual two radio operators plus space for a data logger radio linked to the SAR computer system.

Apart from an Alinco 430 for UHF, all transceivers are Icom F5063 and F7000 type-approved rigs for SAR & CD work. Also a 2100H and a 707 for amateur VHF and HF. In the cab, a 290 VHF.

■ continued on page 40

Other equipment includes a laptop computer, BGAN satellite phone and a portable ES Band repeater.

There is mounting space for more equipment as required with PRS and a type approved VHF backup likely additions. Demountable poles for HF dipole support and whip mounting stow under the bench with bins for small items on shelves. Interior lighting is all LED.

For crew amenities, hot drinks are provided from an electric kettle when mains power is connected, otherwise from a propane stove. If anyone is wondering about the name, as an ex-paddy wagon, 'Patrick' was the only logical choice.

*Gordon Cooper ZL1KL
Tauranga Branch 88.*

Activity Briefs

(A selection from Nov/Dec.)

1/11/10. North Canterbury Branch 68. Rural Fire. Waimakariri River near Eyrewell Forest. Fire in grass and young pine trees in riverbed, fortunately well downwind from the forest itself. Multiple appliances turn-out from NZFS and Forestry/Rural units. Fire quickly subdued, Forestry units completing the mopping-up operations. AREC provided comms/logistics to forestry units.

1/11/10. New Plymouth Branch 27. SAR. Mokau River, North Taranaki. Three pig hunters overdue. Overdue party returned unaided, late return due to lost dogs.

8/11/10. North Canterbury Branch 68. Rural Fire Training. Ashley Forest, North Canterbury. Annual, pre-fire season, "Live Fire" Exercise. Live practice, not only for new-chums on the fire teams, but also for foresters, etc, who are back-up crews in the event of a real forest fire. AREC's role is to operate the ICP unit.

13/11/10. Christchurch Branch 05. SAR. Cave Stream / Broken River. Search for missing fisherman; overdue after day's fishing. Missing party walked out during the morning and was assisted by a member of the public to get to the ICP. The fisherman

had become disorientated and lost. He had suffered several falls and also fallen into river at one stage.

13/11/10. New Plymouth Branch 27. SAR. Fanthams Peak, Mt Egmont. Two trampers lost in snow and wind on the mountain. Lost people located at 3am and assisted off the mountain.

13/11/10. New Plymouth Branch 27. SAR. Matemateonga Bush, East Taranaki. Male tired and lost track. After resting and looking at map, male relocated track and continued with tramp.

14/11/10. Eastern BOP Branch 51. Sports & Training. Whakatane. A 18km run and walking event held annually through the Toi walkway between Whakatane and Ohope. 500 plus entries. Good management of event with several competitors needing assistance for injuries.

15/11/10. Eastern BOP Branch 51. SAR. Whakatane. A youth with a mental age of 10 missing overnight after leaving parents at Ohope. During interview with parents at police station he was found in a shop as a result of a notice from local radio 1XX.

19/11/10. Westland Branch 49. SAR. Pike River Coal Mine, Longburn Road, Atarau. Explosion at Coal mine, assisted with comms from midnight on the Friday, set up SAR repeater Saturday morning for comms from the vent shaft back to base. We were involved on six days at various times as well as being on stand by at other times.

20/11/10. Nelson Branch 26. Sports & Training. Lake Rotoiti to Westport. Push bike race from Lake Rotoiti to Westport called Source to Sea. Successful event, no accidents and good communications throughout the day.

21/11/10. Tararua District Branch 06. SAR. Falkner Road, Eketahuna. ETEXT – missing person. Male missing from campsite overnight. Found safe and well at home. Stood down en-route. No resources used.

24/11/10. Hamilton Branch 12. Sports & Training. Waikato River between Cambridge and Taupiri. Safety communications for the Bridge-to-Bridge Water

Ski racing on the Waikato River between Cambridge and Taupiri. Very successful communications. A number of incidents were dealt with. The section STSP performed well. Assistance given by five operators from adjoining areas was greatly appreciated.

5/12/10. Christchurch Branch 05. Sports & Training. Between Mt White Bridge (Arthurs Pass area) and Gorge Bridge (Waimakariri River Gorge). Safety Communications for Classic Kayak race. 119 kayaks travelling from Mt White to the Gorge Bridge end of the Waimakariri River Gorge. Successful communications and all kayaks accounted for as they traversed the river section. This event used 5320 MHz extensively including mobile use in the jetboats with good results.

7/12/10. Eastern BOP Branch 51. SAR. Pikowai Beach. Distressed 15 year old runaway girl last seen on beach. SAR searched till dawn using line search methods. More information at 06.00 about lost party so teams stood down. Good comms on simplex although a relay had to be used at times.

9/12/10. Thames Branch 41. SAR. Dementia patient missing in Waihi. Urban search. Found lying in stream at 2100. Taken to hospital by ambulance.

21/12/10. North Canterbury Branch 68. Rural Fire. View Hill, Oxford. Fire in cut-over slash and stumps. This was a re-light from a burn of some weeks previous and was the first of a continuous series of fires that day, caused by gale-force winds. On returning from this fire and while the crew were refilling water tank at the Ashley River near Rangiora, extensive smoke was noticed in the area. This turned out to be from a fire at the old, disused Loburn sawmill. They investigated and called in an alarm. While attending this one a further call to a nearby macrocarpa hedge on fire required a second Forestry unit to assist NZFS units. AREC provided comms/logistics for the Forestry units.

22/12/10. North Canterbury Branch 68. Rural Fire. Loburn, near

Rangiora. Fire at the old Loburn Sawmill site. Re-light of fire from previous day caused by continuing gale force winds.

22/12/10. North Canterbury Branch 68. Rural Fire. Leithfield, North Canterbury. Fire in Ashworth's Plantation, caused by wires arcing in gale force winds. Multiple unit call-out including three forestry units and four helicopters. Two nearby houses evacuated. Relief crews took over at end of first day.

23/12/10. Thames Branch 41. SAR. 20km south of Thames. Missing aircraft. Lost contact 20km south of Thames. Checked for ELB – nothing heard. Set up ground-to-air base set at Police Station. Plane landed safely at Tauranga.

24/12/10. Otago Branch 30. Rural Fire. Mt Allen Forest, near the township of Mosgiel, Otago. Forest Fire. Mobilise the Dunedin City Civil Defence Emergency Communications Unit to the Fire Ground and set-up for the management team to use.

30/12/10. Eastern BOP Branch 51. SAR. Rotoma Forest. Three runners overdue in Rotoma Forest. Two tracking teams in the bush throughout the night following sign but not till dawn getting a direction of travel. Lost party found at 8.00. All well and brought out to the Tarawera Falls Rd by 9.30.

Conclusion

Thanks to those who have contributed to this issue. Material for the next one to be in our hands by 3 March please. Photos, if included, preferably on a separate CD (with captions) mailed directly to us. E-mailed pictures may be acceptable but will be at the Editor's discretion and must not be embedded in the text. Contact details: <zl3qr@nzart.org.nz> or <zl3ov@nzart.org.nz> or post to 6 Boyd Street, Rangiora 7400, or phone (03) 313 7137.

Reminder

The next Section Leaders Nets should be 21 February and 21 March, 3900 kHz USB at 2030 hr unless notified otherwise.

Until next issue, 73,
Geoff ZL3QR & Bev ZL3OV



Greetings to all readers. I hope everyone had a successful Christmas and holiday time with family and friends. We had Christmas with families and spent Hogmannay at Waipu with the Waipu Highland Games the following day which was all very enjoyable. Since then I have spent quite a lot of time on air chasing contacts for the National System Award. Once again the topic, old and present railway stations has created a lot of interest.

Silent Keys

Unfortunately I have to report that two ex members of WARO have become silent keys. One was *Rhondalin Houton ZL1RBH* who was secretary of WARO for several years. Condolences to her partner Frank ZL1FMA. The second was *Jenny Spackman ZL2RT* who has been a long time member of WARO. Condolences to her husband Tom ZL1WW.

Thelma Souper Memorial Contest 2011

Unfortunately numbers of YLs taking part in this contest has been low over the last few years and it is hoped that if the contest is to continue that more YLs will take part. It would be good to hear lots of WARO members coming up and also other YLs. Last year the highest scoring YL was an Australian! Many OM's enjoy this contest but they need more YLs to work to keep them involved.

The Thelma Souper Memorial Contest will be held on 2-3 April 2011 from 0800z-1000z on Saturday and Sunday evenings. All Contacts to be held on 80 m phone or CW may be used. YLs contact YLs and OM's. OM's contact YLs and OM's. One contact with each station permitted in each half hour period. Call "CQ WARO CONTEST" exchange report, serial number (commencing 001) and name. To qualify as a multiplier WARO MEMBER stations must have contacts with at least 10 different stations.

A Bonus Station using the WARO

call-sign ZL6YL will be in operation for random periods and will count as one multiplier on each night of the contest if worked. All radio regulations must be observed.

Scoring:

To Qualify: Enter date at beginning of each evening. Each log must contain: Time of Contact, callsign of station worked, cipher sent, cypher received and the name of the operator contacted and points claimed for contact.

- Score 5 points for each WARO contact including ZL6YL.
- Score 4 points for Non WARO YL contacts
- Score 3 points for OM contacts, Multiply by the number of WARO members including bonus station if worked.

Logs to have each contact claimed as a multiplier underlined. Include a separate summary sheet showing:

- Your call-sign, name and address.
- The number of contacts.
- The number of WARO members worked.
- Your score.
- Declaration that all radio regulations, have been observed. Logs that do not comply with all the above requirements will be disqualified.

Logs:

To reach the Contest Manager no later than 1 May 2011

Send to: -

Bev Osborne ZL1OS, 34 Cobham Drive, Kawerau 3127, New Zealand.

No logs will be returned and No Correspondence will be entered into.

Awards:

The highest scoring WARO member will be awarded the Thelma Souper Memorial Cup to be held for one year. The highest scoring OM operator will be awarded a trophy to be held for one year. Certificates will be awarded to: The first three WARO members, the first three OM operators, the highest scoring VK/YL operator.

Please Note: Contacts made dur-

ing the contest will count towards the NZ WARO Awards

Future events

The next get-together will be at Paengaroa used equipment sale on 5 March and I hope to be able to attend. We usually meet for morning tea about 10.30 or 11 for a chat and photo.

March 2012 will be the 50th anniversary of WARO and a group is being set up to organise this event. It will probably take the form of a luncheon in Rotorua where the first meeting was held and also a function in the Christchurch area organised by WARO members in that area.

Information has been forwarded about the YL International Meet in Australia next year and I have included the information we have received below. I know some YLs are considering attending and also some OM's and their XYLs like to attend this type of event as well.

33

Lynette ZL1LL

YL International update

The itinerary is pretty well organised. The meet dates are set with delegates arriving on or before 3 May 2012. The next few days will see us tour Adelaide, Hahndorf and Cleland National Park, Port Adelaide and the Dolphin cruise and a progressive lunch at three Barossa Valley wineries. Those that are doing the optional Ghan tour will join it for either a seven or nine day adventure. Several people requested that there be an option to leave the tour in Alice Springs after being out to the Rock. So I have put the option in as well. (Please be aware that it is possible to catch a bus back to Adelaide

but it is a two day bus ride with few stops.)

An expression of interest form is on the website and soon a registration form. If you have already indicated that you plan to attend can you complete the "expression of interest form" as it will give me some important planning information. The new website is at <www.ylinternational2012.com>.

I am now waiting for prices to be finalised. The bus tour company should be able to give me final prices in April of this year. The Ghan prices won't be released until June or July. I have been told there are quite a few YLs from New Zealand and Japan coming and lots of YLs in Germany and the United States seemed interested, not to mention the rest of the world and, of course, Australia. But only a few have told me they are thinking of coming in 2012. I know most of you can't make a commitment until final prices are released but I do need some idea of numbers. Please complete an expression of interest ASAP or send me an expression of interest by snail mail, contact details are below.

There will be a small non-refundable registration fee of \$50 to help me with early costs. You can pay this by direct debit, PayPal international money order or, if in Australia, by cheque. See the website for details of how to do this.

I hope many of you will consider joining us for a great time in Adelaide.

33

Tina Clogg

<vk5tmc@bigpond.com>

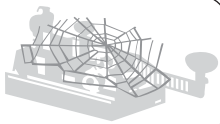
PO Box 78, O'Halloran Hill, SA, Australia 5158



VHF Group Christmas dinner. Lynette ZL1LL, Marlene ZL1MYL, Margaret ZL1AYV, Juliana ZL1VEX and Jenny Henderson

Silent Keys

The Association deeply regrets to record the death of the following members and extends its sympathy to the bereaved.



Silent Keys: guidelines to contributors

Contributors are requested to limit their obituaries to between 200-400 words. Content should focus mainly on the amateur radio activities of the deceased. Normally photographs cannot be included.

Ronald William Murray ZL4MM

With regret, I record the passing of a life-long friend who died on 28 September 2010 at the age of 82. Crippled by poliomyelitis in childhood, Ron was quite unbeaten by his physical limitations and achieved much in his long life. He cheerfully accepted the use of two walking sticks along with carrying several kilograms of iron leg supports. His working life was spent as an accountant in a long-established Cromwell legal office, retiring when GST was first introduced.

Licensed in 1951 as ZL4MM, he was a very active ham for many years. Other interests limited his recent activity but he appeared occasionally on the Queenstown 2-metre repeater.

Ron had a great interest in firearms and once travelled to Australia as a member of a Defense Rifle shooting team. He also had an allied interest in explosives, so using a radio link to remotely

detonate gelignite was an interesting challenge. The writer has distinct recollections of these experiments at least fifty years ago, in particular the last one that went rather wrong. The explosion test site was on the side of a little-used country road and Ron was all set to push the key when a local car drove down the road. Naturally, firing was delayed until the vehicle was well past the danger zone – or that was the intention. However, the old car had no RF suppressors on the spark plugs so the big bang occurred when it was at the closest point to the receiving antenna. Looking through binoculars, I can still see the driver scratching his head and then going round the vehicle kicking each tyre in turn. After what seemed like an eternity he got back into the car and drove on. He never spotted the radio gear.

Another radio-related interest is worthy of note. About forty years ago a local television society was formed and a series of low-power

battery operated translators were installed in the high hills. Ron and others enjoyed many 4WD trips in efforts to find the best sites for the translator stations. He was also a very willing and efficient honorary secretary to the society for many years.

Ron was a noted local historian who willingly shared his knowledge with all. He was co-author of two local historical books along with many other miscellaneous writings. He never married and is survived by a sister and five brothers. We are all the worse for his passing.

Kevin Hayes ZL4MD

John Edward Titheridge

The New Zealand scientist John Titheridge died on 27 December 2010, aged 78. He was not a Radio Ham, but his work profoundly influenced many of us who were, by enhancing our understanding of the ionosphere and its effect on radio waves. It is fitting to note his passing here.

John was a quiet and humble man, but with a razor-sharp intellect which dazzled the many University graduate students he supervised. As one of the world's most respected ionospheric researchers, his reputation was such that he could have worked anywhere. But he chose to spend all his scientific life at the University of Auckland, first at the Ardmore Radio Research Centre, then in the Department of Physics, where over 40 years he produced more than 120 refereed scientific papers.

As a graduate student, I was privileged to attend his lecture course on the physics of the ionosphere. John would enter the theatre with one sheet of paper, written only on one side, folded in half. For the first 30 minutes he would lecture from the top half of the paper, then turn it over and lecture from the bottom half. It was clear that almost everything

he said came from his amazing memory and ability to formulate complicated mathematical treatments on the fly.

He was the first to identify the regular amplitude fluctuations of early satellite signals as the "Faraday effect", predicted theoretically many years before. He developed an innovative technique to determine ionospheric parameters from this fading.

He was a world authority on the operation of ionosondes, the swept-frequency transceivers used to determine the virtual height and ion density of ionospheric layers. The plots they produced, "ionograms", had been recorded for many years, but could not "see" above the height of maximum ionisation. However, they usually showed two distinct traces, due to the "ordinary" and "extraordinary" rays caused by the wave's interaction with the earth's magnetic field, and John evolved a numerical technique which used both traces to estimate the ion density above the ionisation peak as well. This culminated in his development of a computer code, "POLAN", which is now a standard ionospheric analysis tool all over the world.

With his passing, we lose another of the small, but very influential group of New Zealand radio researchers who have international reputations. I will miss his quiet advice on topics that I have written about over the years in the "Morseman" column of this journal. Few radio Hams knew him, but his work made a difference to all of us who use HF propagation.

Gary Bold ZL1AN

Roy Timms ZL3AIB

It is with sincere regret that we record the passing of Roy Timms ZL3AIB on Monday 3 January 2011. Roy served Branch 56 for many years as Auditor and Archivist and was made an Honorary Life member of the Branch last year.

■ continued from page 35

cypher received and the name of the operator contacted and points claimed for contact.

- Score 5 points for each WARO contact including ZL6YL.
- Score 4 points for Non WARO YL contacts
- Score 3 points for OM contacts, multiply by the number of WARO members including bonus station if worked.

Logs to have each contact claimed as a multiplier underlined. Include a separate summary sheet showing: Your call-sign, name and address. The number of contacts. The number of WARO members worked. Your score. Declaration that all radio regulations, have been observed. Logs that do not comply with all the above requirements will be disqualified.

Logs:

To reach the Contest Manager

no later than 1 May 2011

Send to: -
Bev Osborne ZL1OS
34 Cobham Drive
Kawerau 3127
New Zealand

No logs will be returned and No Correspondence will be entered into.

Awards:

The highest scoring WARO member will be awarded the Thelma Souper Memorial Cup to be held for one year. The highest scoring OM operator will be awarded a trophy to be held for one year. Certificates will be awarded to: the first three WARO members, the first three OM operators, the highest scoring VK/YL operator.

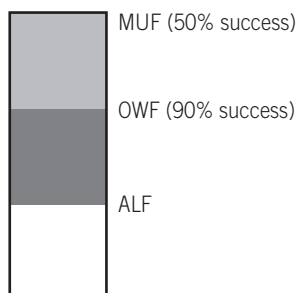
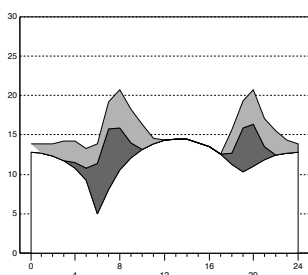
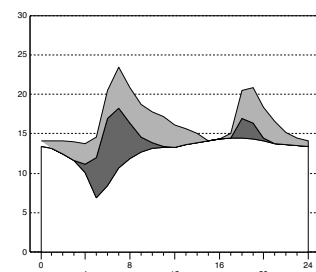
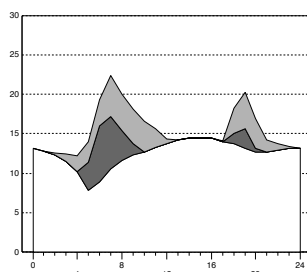
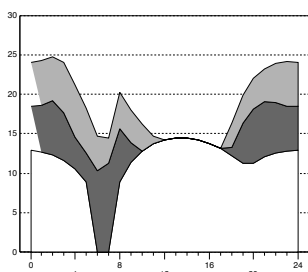
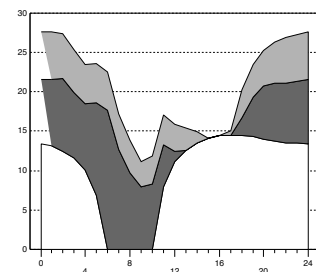
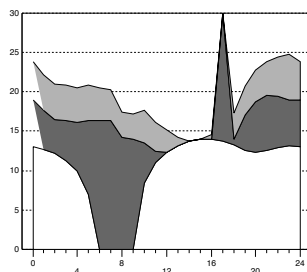
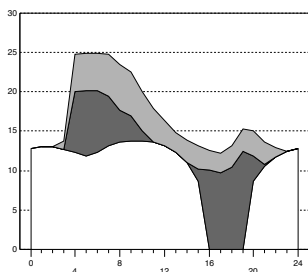
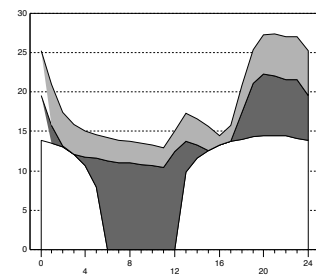
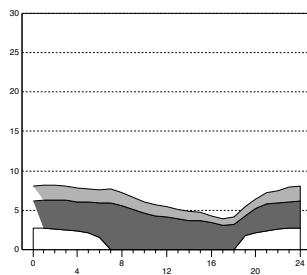
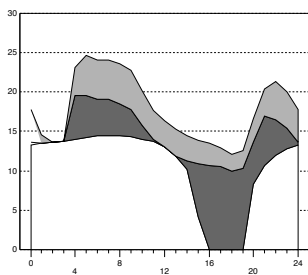
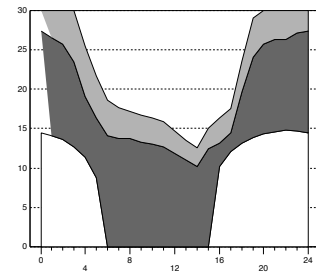
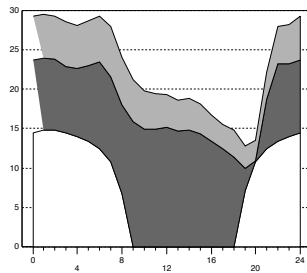
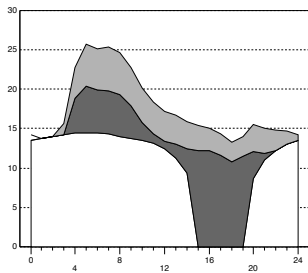
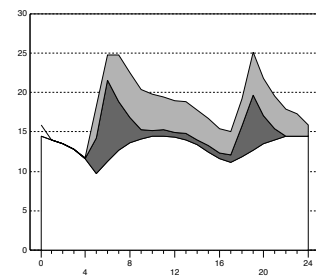
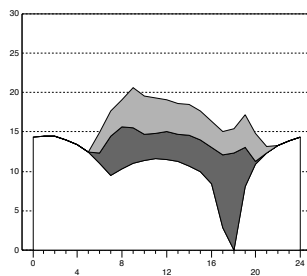
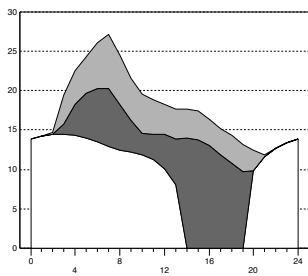
Please Note: Contacts made during the contest will count towards the NZ WARO Awards.

Ionospheric Predictions



MARCH / APRIL 2011

T-index = 46



Horizontal axis shows time in UTC.

Vertical axis shows frequency.

Propagation is possible in the shaded areas, with best operation in the darker area.

These predictions are based on solar activity data supplied by IPS Radio and Space Services.

See pages 6–9, Break-In May/June 2004 "Choosing the Best Frequency" by the late John Gabites ZL2AQ for interpretation of forecasts and explanation of terms MUF, OWF and ALF.

HAMADS



WANTED: RADIO VALVES. Cash paid for old radio and TV valves. Prefer new in boxes. Ph (09) 575-6940 or E-mail <paul.ssegrub01@gmail.com>.

WANTED: Valves wanted to purchase, fair price paid, all types but esp following types ECC32, ECC33, ECC34, ECC35, B65, 6SN7, 6SL7, ECC81, ECC82, ECC83, ECC803S, ECC88, E88CC, E188CC, 7308, EF86, KT61, KT66, KT88, EL34, EL37, PX4, PX25, GZ32, GZ33, GZ34, GZ37, CV378, CV575, VT52, 45, 50, 211, 801, 805, 845. Also looking for an AVO or Weston Valve Tester and a good quality capacitor tester. Geoff Edwards, Valve Radio Spares, 12 Oxford St, Lyttelton 8082. Ph (03) 328-9208 or (027) 433-8452 or Fax (03) 328-9207 or E-mail <tubehead@xtra.co.nz>.

FOR SALE: Hallicrafters SX-111 Receiver \$30. KW-77 Amateur Bands Receiver \$40. Q-Electronics Q5 Amateur Receiver \$40. Eddystone 770/u VHF/UHF Receiver \$25. Marconi R1132 VHF Receiver \$25. AWA AR8D Receiver and PSU \$25. Heathkit-Daystrom 5 inch CRO \$20. Yaesu FT-840 HF Transceiver \$700. ZL2TC. Ph (06) 843-8519 or E-mail <laurie.winton@orb.co.nz> or *Call Book* address.

FOR SALE: Valves; all NOS. RCA 8165/4-65A VHF beam tetrodes (x3), Trigon 6DQ6B sweep tubes (x4), Sylvania (USA) 6JB6 sweep tubes (x4). Offers to John ZL3IB, Ph (03) 348-9084 or E-mail <john.zl3ib@ihug.co.nz> or *Call Book* address.

FOR SALE: Radio Handbook 15th Edition 1959 – Free. Collect or you pay postage from Wellington. ZL2DT. Ph (04) 388-2589 or *Call Book* address.

FOR SALE: A4S Cushcraft 20-15-10 metre beam (With instructions for assembly) \$300. Kikusui oscillos-

cope, 2 channel, 50 MHz BW, Model 5630 \$100. Textronics Logic analyzer, Model 318 \$80. Marconi Output power meter, Model TF893A \$30. Contact ZL1DMB. E-mail <derek_boshier@hotmail.com>.

FOR SALE: Yaesu FT-60R VHF/UHF HT in original box c/w manual and charger plus extras – ADMS-1J programming software with 9 pin serial cable and adapter, E-DC-5B car cigarette lighter battery charger, CT-44 Mic adapter, \$400 the lot including delivery in NZ. Photos at <homepages.slingshot.co.nz/~lorne.douglas>. ZL3LSD. Ph (03) 358-9100 or E-mail <lorne.douglas@gmail.com> or *Call Book* address.

FOR SALE: Icom IC-735 Transceiver \$500. All HF bands, ideal mobile rig. New rotary encoder fitted by Icom NZ. All manuals. Bob ZL1BAD. Ph (09) 232-8775 or E-mail <bobknowles@xnet.co.nz> or *Call Book* Address.

FOR SALE: 3m (10') galvanised steel tower 330mm equilateral triangle sections. Professionally designed engineering – commercially manufactured from welded steel 40mm diameter tubing. Each section bolted to its partner. Nonreactive guys available for heights above 12m. Example: see front cover May/June 2008 *Break-In*. \$200 each section. ZL1AHZ. Ph (09) 436 3191 or 0800 009 339 (pin 1955) or E-mail <brian-pep@xtra.co.nz>.

FOR SALE: ONE ONLY free standing professionally designed and manufactured tilt and crank 13m galvanised tower. Top section has tri-bander mast bearing support and rotator cage. Installed with recommended foundation meets suburban erection criteria. \$1200. ZL1AHZ. Ph (09) 436 3191 or 0800 009 339 (pin 1955) or E-mail <brian-pep@xtra.co.nz>.

Hamads and Classified Advertising in *Break-In*

Hamads up to 30 words are now free as a service to members but the following conditions will apply:

(1) Hamads. A single, free Hamad in each issue of *Break-In* is only available to financial members and Branches of NZART buying or selling personal equipment. Members and Branches wishing to use this service must include their NZART Membership Number or other evidence of membership. If possible they should use the official HAMAD form (on the reverse of their address sheet). If this is not convenient the advert may be emailed or sent typed double-spaced, but proof of current membership must be provided.

Each free Hamad is limited to 30 words; any extra words will be charged at the current rate of 25c per word, telephone and fax numbers count as two words each, e-mail addresses and *Call Book* address as three words each. All prices include GST. Free Hamads will also be accepted for sales of deceased estates where the member was a financial member of NZART during the past 12 months and from branches who are financial members of NZART (ie have a Membership No).

Advertisements are accepted in good faith from amateurs and may only be used be the sale of used radio and allied equipment. The Association, or its representatives, can take no responsibility for them nor take part in any discussion resulting from sales or purchases; remember "Caveat emptor". In case of dispute, the Editor's decision is final.

Trade or business adverts, even from members, will not be accepted here, since this is a subsidised service to members.

(2) Classified Advertisements are available to members, non-members and commercial firms offering products or services for sale, etc. All adverts not meeting the Hamad criteria will be considered to be Classified Advertisements.

Classified Advertisements will be charged at 40c per word. Bold type is available at 50c per word. For semi-display (ie rule above and below) add \$5.00. All Classified Advertisements must be pre-paid, receipts will not be given. All prices include GST.

(3) Display style adverts will be still be charged for at the current rates.

(4) Closing date. Please send Hamads and Classified Advertisements to The Advertising Manager, PO Box 1733, Christchurch, to be received no later than the 10th of the month prior to publication. Please make cheques payable to NZART; no cash or credit cards. The Editor and NZART Inc reserve the right to discontinue or decline any advertisement.

For further information and commercial advertising rates, please contact:

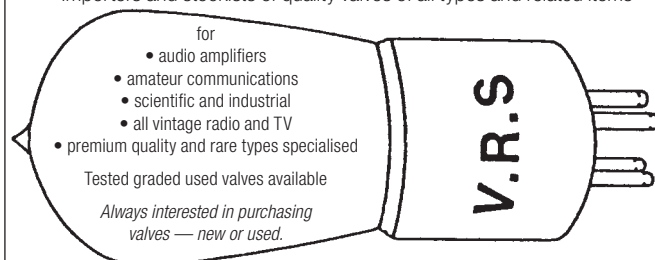
Lorne Douglas ZL2AHB, Advertising Manager, c/- PO Box 1733, Christchurch. Telephone (03) 358-9100. E-mail: <hamads@nzart.org.nz>.

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Des ZL3AK giving good advice.



Steady hand game.



Aidan ZL3notyet helps another youngster.

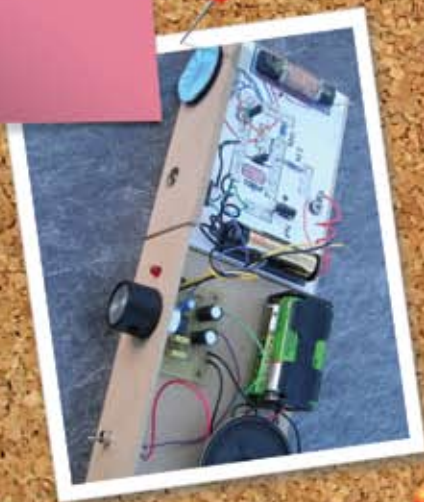


Field station in the liquifaction.



PCB building.

Speaker amplifier:



Testing the radio.



Student with radio.



Putting up the mast.

RadiotEK; a day of radio technology
 By Kelvin Barnsdale ZL3KB
 On Sunday 7 November, Christchurch Branch 05 held the first of a series of fun days with a radio theme.

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